Journal
OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

AVMA Convention—San Antonio, Oct. 15-18, 1956

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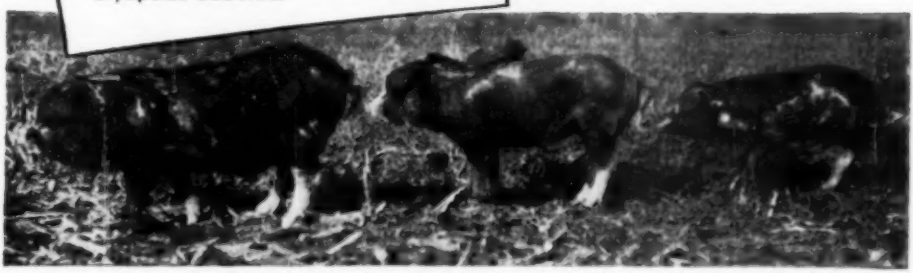

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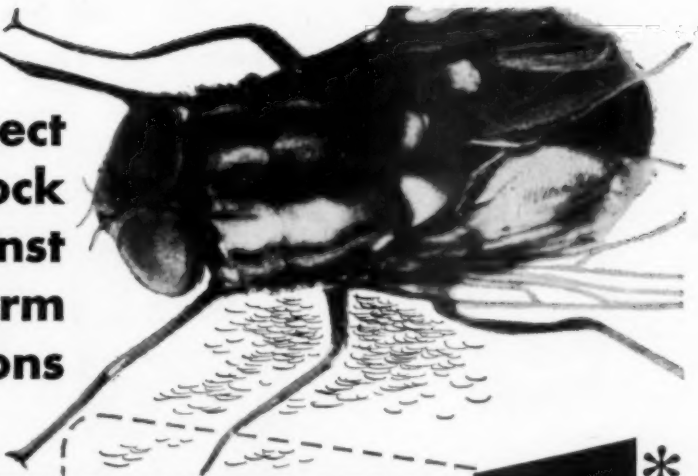
protect livestock against screw worm infestations



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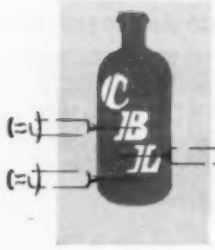

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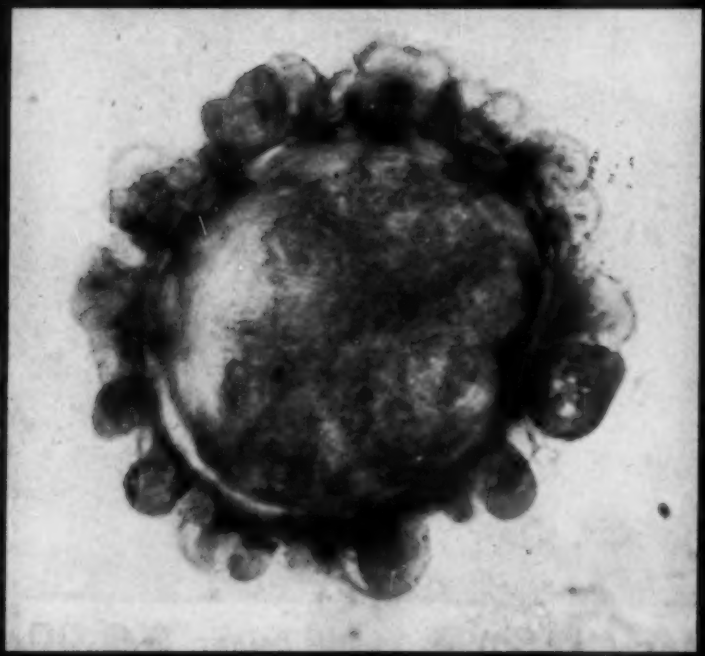

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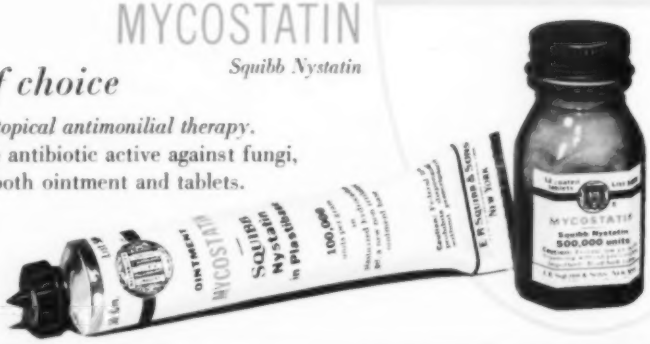
MYCOSTATIN

Squibb Nystatin



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Pharmacology . . . Indications . . . Supply . . . Dosage

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INDICATIONS: Canine Leptospirosis, Strangles, Shipping fever, Pneumonia, Calf scours, Necrotic laryngitis, Secondary infections concurrent with most viral infections, Necrotic enteritis, Chronic respiratory disease of chickens, Metritis, Cystitis, Mastitis.

SUPPLY:
Capsules: 50, 100, 250 mg.

Intramuscular: 100 mg., 1 gram, 2.5 grams.

Intravenous: 250 mg., 500 mg.

DOSAGE: *Oral: Small animals*, 25-50 mg. per lb. of body weight per day in divided doses

Large animals, 5-10 mg. per lb. of body weight per day in divided doses

IV or IM: *Small animals*, 5 mg./lb. daily.

Large animals, initially 2 grams followed by 1 gram daily for 3 or 4 days or until recovery.

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PHARMACOLOGY: Mysteclin combines two important antibiotics for safer therapy: Steclin for wide anti-microbial activity with fewer side effects; Mycostatin (Nystatin) for prophylaxis against overgrowth of Candida albicans (monilia).

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(Mystatin)

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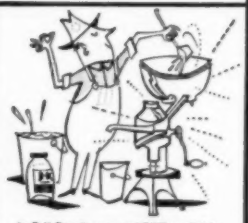

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News From Washington

The U.S.D.A. announced that the **last federal quarantine** against **vesicular exanthema in California** was lifted effective April 18, all known active cases having been stamped out. In the rest of the U.S. only one county and parts of 21 other counties (Conn., Mass., and N.J.) remain under quarantine. All states except Connecticut and New Jersey have laws prohibiting feeding raw garbage to swine.

* * * *

Consultants appointed by the Secretary of Agriculture (see JOURNAL, Sept., 1955, p. 277; and Nov., 1955, p. 465) **have endorsed basic features in** the current **state-federal brucellosis program.** (The Brucellosis Committee urged that all states establish target dates for brucellosis certification. (Copy of the Committee report may be obtained from Press Service, Office of Information, U. S. D. A., Washington 25, D.C.)

* * * *

The President has just requested Congress to include $18,915,000 in the U.S.D.A. budget for 1957 for construction of an animal disease laboratory at Beltsville, Md. (see JOURNAL, Sept., 1955: p. 277).

* * * *

Bills to provide for **compulsory inspection of poultry and poultry products** by the U.S.D.A. were recently introduced in Congress by Mr. Hoeven (H.R. 10514), Mr. Polk (H.R. 10527), and Mr. Aiken (S. 3588) for himself and Senators Allott, Bennett, Bricker, Cotton, Payne, Smith of Maine, Williams, and Frear. Certain sections of the bills as written are interpreted as continuing inspection under AMS rather than placing it in ARS under Meat Inspection Branch. (For bills previously introduced, see JOURNAL, March 15, adv. p. 12.)

* * * *

Introduced by Senator Ellender and referred to the Committee on Agriculture and Forestry, S. 3668 would increase the authority of the Secretary of Agriculture to **provide further protection against the dissemination of diseases of livestock and poultry.** Copies may be obtained by writing Senate Document Room, U. S. Capitol Bldg., Washington, D.C.

* * * *

Senate Armed Services Committee did not amend H.R. 9428 (see JOURNAL March 15, adv. p. 12) **to include veterinary officers** in any provision of the House-passed bill. The AVMA representative, when testifying on April 11, pointed out many of the justifications advanced for enactment of the legislation for medical and dental officers were equally applicable to veterinary officers, particularly emphasizing the long and expensive years of professional education required, and the average age of the veterinarian appointed in the Regular Army or Air Force. The latter were given as reasons in the House committee report for granting an additional year of constructive service credit to medical and dental officers and counting that service for basic pay purposes.

* * * *

According to unofficial report, the **present doctor draft act will be allowed to expire July 1, 1957,** and the Department of Defense will ask for an amendment to the regular draft, which would provide for special registration of physicians and dentists and their selective call up to age 35.

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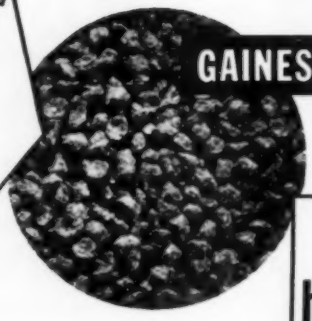

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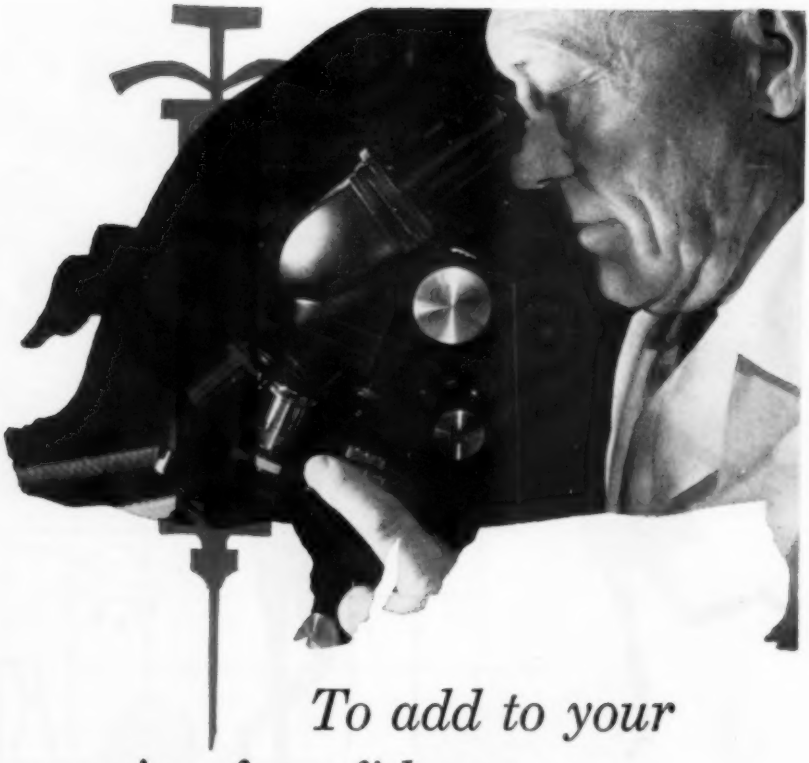

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Anemia in the Cat

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CATS, of all the domestic animals, probably suffer most often and most severely from anemia, and recognition and management of the varieties of this condition constitute the most significant challenge in cat practice. Owing to the cat's extraordinary ability to hoard its forces under conditions of limited oxygen uptake, a profound anemia may develop before there are definite symptoms to attract an owner's attention. In an extensive cat practice, one often sees an anemic animal so close to death that even a brief delay before transfusion or the handling associated with examination would be fatal, and the first and immediate step must be administration of blood.

The nature of the problem is underlined by a brief consideration of the difference in the use of blood transfusions as between dogs and cats. In the dog, the vast majority are given in situations associated with shock or acute blood loss resulting from injury or surgery. Exactly the opposite is the case with cats. Except with ruptures of the liver or spleen, fatal bleeding associated with injuries is rare and the need for transfusion during surgery is negligible; most transfusions are given as supportive treatment in anemia associated with hemolytic disorders or deficient erythrocyte production.

To call attention to the problem rather than to account for its existence is the purpose of this paper. Although an attempt will be made at broad classification of the feline anemias with a view to indicating prognosis and rational treatment, it is recognized that a number of cases, at this stage in our knowledge and with the diagnostic procedures ordinarily available, will defy "pigeonholing."

There are many reasons why an accurate diagnosis of the cause of anemia in a cat may be difficult or impossible. A basic obstacle is the scarcity of information on the blood picture of the truly normal cat. Although considerable work has been done with supposedly normal animals,[5,9,14] it must be borne in mind that such studies are usually carried out with groups of laboratory cats, frequently disease-ridden and maintained in an artificial and sometimes unfavorable environment. Not only do the values so obtained vary widely, but it is a question whether they are actually representative of those of healthy animals living normal lives.

Other factors complicate the diagnosis of anemia. Of first importance is a complete history with regard to diet, previous or concurrent ailments, parasitism, and possible exposure to noxious substances. If a cat was acquired as a stray, however, or leads a nomadic existence, the essential clue may well be unavailable.

Further difficulties are associated with performing the diagnostic tests required to elucidate a puzzling case of anemia. Al-

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The author thanks Dr. Jean C. Flint, of the veterinary staff at Colorado A. and M. College, for generously sharing his more recent findings on infectious anemia[8] and for confirming the diagnosis of the condition in a number of blood films submitted to him; Dr. Edna Tompkins and Dr. Joseph Sieracki, New England Deaconess Hospital, Boston, for their assistance in the interpretation of the blood picture in several animals; Dr. Arthur T. Hertig, Harvard University School of Medicine, for his suggestions regarding the case of uterine hemorrhage; and Dr. Hans Meier, Angell Memorial Animal Hospital, for his painstaking work in relating histopathological findings to types of anemia in a number of cases. Indispensable technical assistance has been given by Mr. Harold Marena, Angell Memorial Animal Hospital, through his patience and skill in obtaining blood samples and giving transfusions; and by Mr. Leo Goodman, Boston City Hospital, through his wizardry in photographing blood films. The color plate was made possible, in part, through the generosity of the Massachusetts Society for Prevention of Cruelty to Animals.

though it is most desirable to obtain a blood sample before treatment in order to form a general idea of the type of anemia, the patient is sometimes so close to death that no blood at all can be drawn from a vein and a transfusion must first be given simply to maintain life. Even when a blood sample can be obtained, it is frequently insufficient for all the tests that might be helpful. Occasionally a blood film alone must suffice. Bone marrow biopsies are, likewise, hard to get in an animal that can stand very little stress in handling and can not be subjected to anesthesia.

Finally, the cost of hospitalization or treatment may be prohibitively high in a baffling or refractory anemia, where life must be maintained by repeated transfusions, laboratory tests must be repeated at frequent intervals, and therapeutic trials over a long period may ultimately provide the only means of arriving at a diagnosis.

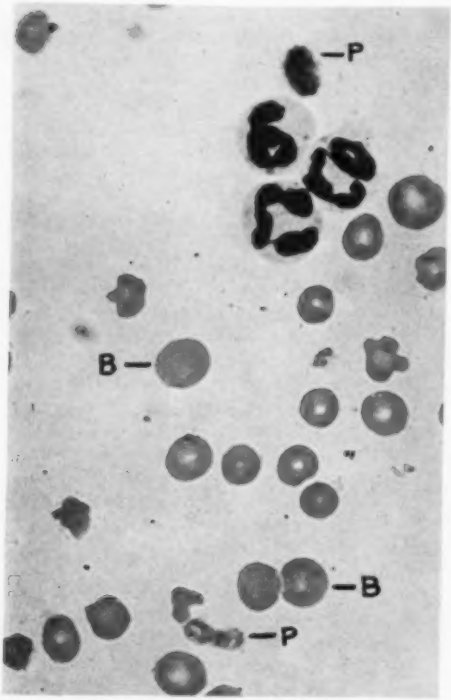


Fig. 1—Abdominal hemorrhage, with hemangiosarcoma of the liver in a 13-year-old, castrated male cat. Neutrophilia, giant platelets (P), and large basophilic erythrocytes (B) indicate increased marrow activity. Distortion of several erythrocytes suggests fragility due to immaturity. The hemoglobin was 2.7 Gm. per 100 cc. of blood; leukocytes, 23,500 per cubic millimeter of blood. x 950.

DIAGNOSTIC PROCEDURES

Despite these difficulties, every attempt must be made at the outset to determine the character of a given case of anemia. For, as Castle and Minot[2] remark succinctly:

> When called upon to treat a patient with anemia, the physician should clearly recognize that he will probably be faced with one of two diametrically opposed possibilities. Either an opportunity is presented for brilliantly successful treatment of a disabling ailment, or there is at hand a potentially fatal condition for which there is no specific treatment.

In addition to suggestions contributed by the history, physical examination may well provide essential clues, if special attention is given to the possibility of parasitism, fever, jaundice, abnormal urine or stools, lymph node or splenic enlargement, or the presence of other masses. In many instances, the diagnosis will depend upon the performance of laboratory tests.

Both hemoglobin and hematocrit determinations are commonly employed measurements of anemia, the latter, however, being preferred by many, since it is less subject to error and the result is unaffected by alterations in the pigment content of the serum.* Ideally, correlation of hematocrit and hemoglobin determinations with erythrocyte count should permit estimation of cell volume and cellular concentration of hemoglobin†—useful indications, if accurate, as to the type of anemia. However, the tremendous error inherent in the erythrocyte-counting method renders the values obtained, except by the most experienced and expert, of questionable worth.

In practice, these two qualities may probably be estimated far more accurately from inspection of a stained film. This, when well made, is in fact the most important single diagnostic aid, for it gives information as to bone marrow activity (evidenced by the presence of immature erythrocytic forms), the morphology of the erythrocytes, and the presence or absence of blood parasites. Together with a total leukocyte count, it also permits an estimation of the nature of the leukocyte response. If further evidence as to erythrocytic regeneration is desired, a reticulocyte count may be made. Subclinical jaundice may be detected by icterus index and urinary bilirubin determinations and, to distinguish the jaundice of hemolytic anemia from that of liver disease, a serum bilirubin (Van den Bergh) test, as well as urine and fecal

*For work with cats, the microhematocrit method is most practical, since the capillary tube requires only a minute quantity of blood.

†Normal values, as obtained by a number of workers, are given by Wintrobe. His bibliography also includes other references on the blood picture in normal cats. Additional material is available in a review of the literature (1936-1946) by M. V. Gardner,[9] and in an article by A. C. Da Silva.[5]

urobilinogen determinations, may be required. In man, once an anemia has been recognized as hemolytic, still other tests may be performed, some of which would undoubtedly be of value in animals.

Together with the information supplied by history and physical examination, resort to some or all of these tests should indicate to which of three broad physiological types, as indicated by bone marrow activity, a given case of anemia belongs: (1) acute and subacute blood loss, (2) hemolytic anemia, (3) anemias due to decreased production of erythrocytes.[10] Whether or not the exact cause of an anemia will ultimately be defined, a provisional prognosis and recommendations for treatment may usually be given on the basis of this classification. Table 1 gives characteristic laboratory findings in each variety of anemia, the conditions likely to give rise to them, and the type of therapy to which a response may be expected.

Analysis of Clinical Material

A group of about 120 feline anemias observed at Angell Memorial Hospital over the past five years constitutes the material for this study. Most of the cats were the writer's patients; a few were followed in collaboration with colleagues. In most of the cases, there was ultimately reasonable certainty as to the type of anemia. In some instances, an early death, an owner's unwillingness to go on with treatment, limitation of laboratory work, or failure to obtain a necropsy resulted in a doubtful diagnosis. A few cases characterized by puzzling contradictions, a complexity of possible causes or, worst of all, by a virtual absence of all clues remained riddles to the end.

Regardless of the cause of an anemia, the symptoms commonly reported by owners, although nonspecific, are similar: lethargy, weakness, inappetence, and occasional vomiting. The nose or ears may seem less pink than usual. Licking of concrete, gravel, or rusty metal has occasionally been observed. As death approaches, restlessness and dyspnea due to anoxia develop. Other signs that will be detected by the veterinarian, in addition to pallor and sometimes jaundice, are heart murmurs and increased vesicular sounds in the lungs. Handling greatly accentuates the cardiac and respiratory distress.

It is helpful to remember that a cat that is dyspneic owing to anemia is pale and usually lies on its side, while a cat that is dyspneic due to the presence of abnormal fluids or masses in the chest is cyanotic and prefers the sternal position. In anemias associated with infection and some leukemias, the temperature is elevated. In many, it is normal. With very few exceptions, the temperature becomes subnormal as death approaches.

I. Acute and Subacute Blood Loss or Internal Bleeding Without Iron Deficiency

In acute blood loss, external or internal, when there is no lack of iron, the bone marrow responds within a few hours with production of both erythrocytes and leukocytes. Large erythrocytes (macrocytes), erythrocytes with nuclear remnants (reticulocytes), and occasional nucleated erythrocytes appear; platelets are increased; and a neutrophilic leukocytosis develops. With internal bleeding, a moderate jaundice may appear. Effective measures in this type of anemia are control or removal of the cause of hemorrhage and a transfusion or other fluid therapy to restore blood volume.

In the cat, severe bleeding from external wounds seems rare but, occasionally, fatal internal hemorrhages follow injuries, castration, or spaying when ligatures are not used. In 1 cat, lethargy and inappetence were associated with massive retroperitoneal hemorrhage following castration. This was apparently due to a defect in the clotting mechanism since, after an exploratory operation, the abdominal incision also oozed blood for several days.

Far rarer in cats than in dogs is acute hemorrhage from vascular tumors (hemangiomas, hemangiosarcomas) of the liver or spleen. Two such instances have been observed, however, in aged cats in which there was nearly fatal hemorrhage from a hemangiosarcoma of the liver. The blood picture in the cats was of neutrophilic leukocytosis and erythrocytic regeneration without pigment deficiency (fig. 1). On necropsy, the bone marrow gave evidence of myeloid and erythroid hyperplasia.

II. Increased Destruction and Production of Erythrocytes

In hemolytic anemias, there is increased destruction of erythrocytes and the marrow responds by increased production. The erythrocytes, which may or may not be enlarged, are normal in hemoglobin concentration. Other characteristics are bluish or other abnormal coloration of the erythrocytes (basophilia, polychromasia), reticulocytosis, and the presence of numerous nucleated erythrocytes. In lead poisoning, there may be basophilic stippling.

Acute hemolytic anemia may be accompanied by marked leukocytosis; in the chronic form, the total leukocyte count

may be normal. Platelets are frequently increased. Blood-pigment metabolism is affected, and the signs vary with the acuteness of the disorder and the liver's ability to handle the increased burden of pigment disposal. In the acute forms, there may be hemoglobinemia and hemoglobinuria, or increased bilirubinemia may be accompanied by jaundice and urobilinuria (only if the liver is damaged does bilirubinuria occur). An increase in urinary and fecal urobilinogens is characteristic of hemolytic anemia. A high fecal urobilinogen may be the chief clue in chronic hemolysis, in which plasma bilirubin may not be increased. In many hemolytic anemias, the spleen is enlarged, since it is involved in blood destruction and may also, in an emergency, resume its role in the formation of blood.

Causes of erythrocyte destruction may be infection with parasites of the erythrocytes or hemolytic bacteria, antibody and autoimmune reactions, incompatible transfusions, and exposure to toxic substances such as lead, certain compounds of benzol and phenol, naphthalene, saponin, snake venom, coal tar antipyretics, and the sulfonamides. Hemolysis may also accompany certain leukemias and splenic disorders.

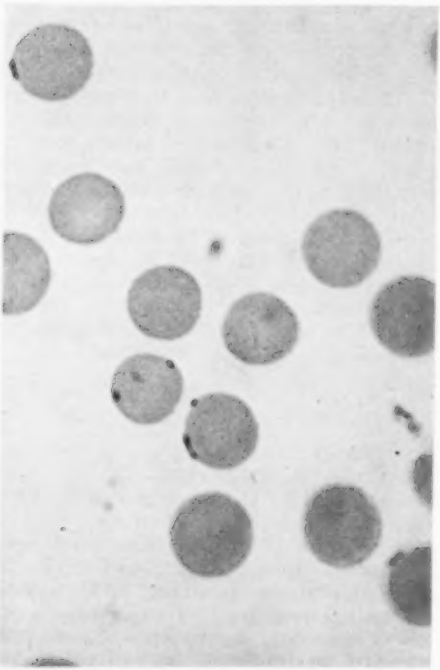


Fig. 2—Erythrocyte bodies of infectious hemolytic anemia. Minute, deeply staining bodies lie upon the periphery of four of the erythrocytes (2 near the center of the field and others at the upper left and lower right corners). x 1,400.

Treatment consists of transfusion and of removal, or avoidance, of the cause of hemolysis when possible. In some types of hemolytic anemia in man splenectomy is effective.

Hemolytic anemia is not uncommon in cats, and the only specific feline anemia described to date belongs to this group. In January, 1953, Flint and Moss[7] reported an infectious anemia in a 4-year-old, male cat with an abscess and fever. Blood findings were leukocytosis, in which lymphocytes predominated, irregularities of size and shape of the erythrocytes, and the presence of many nucleated erythrocytes. On, and apparently attached to, many of the erythrocytes were small bodies resembling the Anaplasma bodies seen in cattle, except that not all were marginal. Treatment included transfusions, penicillin, liver extract, and vitamins. The cat recovered. Experiments indicated that, although no etiological agent could be cultured, inoculations of blood from affected cats were capable of reproducing the disease. Jaundice and hemoglobinuria were not observed. Splenectomy had no very pronounced effect on the course of the disease.

In animals other than the original patient, the erythrocyte bodies were pleomorphic, appearing not only as small round bodies but also resembling small rings, commas, tennis racquets, or short rods. The erythrocyte bodies were not present at all times in the peripheral blood. An episode in which an apparently healthy donor with a normal blood film transmitted the disease to all recipients of its blood introduces the possibility that blood transfusions may not be without hazard. In the opinion of D. Weinman, of the Yale University School of Medicine, the erythrocyte bodies were suggestive of either Haemobartonella or Eperythrozoon.

Although questions as to the identity of the etiological agent and the exact nature of the erythrocyte bodies may remain unsettled for some time, it would appear that this infection may account for a considerable proportion of the cases of anemia in cats. These bodies (fig. 2) were recog-

nized with varying degrees of certainty, at one time or another, in almost a quarter (28) of the group of cats under study, and this estimate is more likely to be too low than too high, owing to the fact that the bodies can be recognized only in well-made, well-stained‡ films and may easily escape notice in poor preparations or be absent from the blood on the particular day when a sample is taken.§

The 28 cats ranged in age from 6 months to 10 years, 14 being 2 years old or younger. Fourteen were uncastrated and 7 were castrated males, 5 were unspayed and 2 were spayed females—a distribution that closely parallels that of sick cats in our hospital population generally. Three quarters of the cases occurred in the periods of September through January. In three instances (and possibly a 4th), 2 cats in the same household were affected.

In 12 cats, anemia appeared to be uncomplicated by other disorders. In the rest, a variety of conditions were present concurrently: wound infections, internal parasitism, pneumonitis, mouth infection, nephritis, and liver disease. In two instances, blood transfusions had been given less than a month before, one during spaying and the other in a febrile leukopenic attack.

Fleas were found on 10 cats and may have been present on more. Inappetence, lethargy, and weakness appeared most frequently in their histories; the more observant owner occasionally noticed "pale noses" or "brown urine." On examination, a cat would appear weak, pale, and sometimes dyspneic. In 9 animals, an enlarged spleen was palpable. In 8 cats acutely ill, mild jaundice was observed. Traces of bile were detected in the urine of 3 cats. Moderate fever was present at admission in more than half; the rest, including most of the more severely affected, had normal or subnormal temperatures.

Blood studies were carried out with varying degrees of thoroughness throughout the course of an illness but, for diagnostic purposes, findings on admission and before treatment was started were considered most significant. Hemoglobins in more than half the cats ranged between 1.5 and 3.0 Gm. per 100 cc. of blood. In 1 cat with an unusual chronic anemia which was followed for over two months, the hemoglobin did not fall below 10.0 Gm. In more than half the cats, the total leukocyte count was above 10,000 per cubic millimeter of blood, 22,000 being the highest observed. Four cats had leukopenia. In the differential counts, normal distribution or neutrophilia occurred with about equal frequency; in 4 cats there was a lymphocytosis. An increase in monocytes was occasionally observed.

To varying degrees, the characteristics of hemolytic anemia were present in almost all the blood films: marked variation in erythrocyte size (anisocytosis), polychromasia, and increase in platelets, reticulocytes, nucleated erythrocytes, and Howell-Jolly bodies (fig. 3a). In a very few of the cats, the diagnosis depended entirely on the finding of suggestive erythrocyte bodies, the film otherwise lacking the characteristics associated with hemolysis. In addition to the 8 cats recognizably jaundiced, 6 had moderately elevated icterus indexes.

Blood transfusion was the most valuable therapeutic measure; in many instances, one received the impression that, if an animal could be "tided over" a crisis by this means, it could marshall its forces to overcome or co-exist with the infection. One cat recovered without administration of blood, but the others which recovered required, on the average, two transfusions. One made a good recovery only after seven transfusions and two months of hospitalization.

In a majority, antibiotics (penicillin, penicillin-streptomycin, and terramycin®) were used, on the hypothesis that the infection was of a Bartonella type, but it would be misleading to attempt to correlate use of antibiotics with outcome. As supportive treatment, fluids, vitamins, and multipurpose hematopoietics were also given in most cases.

Hospital stays averaged about ten days for cats which recovered but considerably longer for the refractory patients. Among the cats with uncomplicated anemia, two thirds recovered; the only deaths (2) occurred within a day or so of admission and seemingly resulted from overwhelming infection. In the larger group in

‡While the erythrocyte bodies are often easily recognizable with Wright's stain, Flint believes that the most successful preparations are made with Giemsa's.

§On the other hand, it is not felt that in routine clinical experience so many as 1 in every 4 anemic cats is likely to have infectious anemia. Because of the interest of the writer and her colleagues in this particular type of anemia, it is possible that more than a representative proportion of such cases may have found their way into the particular group under study.

which anemia was complicated by other disease conditions, only a quarter recovered, the majority being destroyed. Of the latter, 2 actually appeared to be recovering when the owners decided not to continue treatment; 3 which had apparently recovered suffered relapses.

The decision as to whether to undertake treatment of a cat with infectious anemia is often difficult for both owner and veterinarian. It would seem that an animal without complications has more than an even chance to recover, but the expense of blood transfusions and laboratory tests may be high. Total charges in cases of infectious anemia at the Angell Memorial Hospital have ranged between the extremes of $25 and $200; charges for cats which recovered averaged $50 but were considerably more for those with a complicated course or unfavorable outcome.

Fourteen cats came to necropsy. Apart from splenomegaly and moderate jaundice observed in some of the animals, there were no striking or characteristic gross changes. Bone marrow smears usually gave evidence of erythroid and myeloid hyperplasia but, in 2 prolonged and refractory cases, there was evidence of depletion and exhaustion. In one instance, rodlike bodies were observed in the immature erythrocytes of the marrow. Typical histological findings in the enlarged spleens were erythropoiesis, erythrophagocytosis with excessive pigment accumulation, and follicular hyperplasia. In one instance, the presence of megakaryocytes confirmed the impression of vicarious hematopoiesis. Generalized lymphoid hyperplasia or lymphadenitis occurred in several cats. Liver changes were recognized in 11 instances. Fatty degeneration was present in the cat in which chronic hemolysis had accompanied a relatively normal hemoglobin. In 2 others, also with protracted courses, degenerative changes were present, together with focal round cell infiltration. In the rest, the changes were limited substantially to round cell infiltration, usually of portal but, in one instance, of mid-zonal distribution. Although these infiltrations were at first sight assumed to indicate subacute hepatitis, variations in maturity of the cells, as indicated by size, nuclear character, and staining properties of nucleus and cytoplasm, suggested that the aggregations actually represented areas of myelopoiesis.

In retrospect, it would seem that a type of anemia observed in a number of cats previous to 1953 and tentatively labeled "splenic anemia," because of resemblance to that syndrome in man, may in some instances have been infectious anemia. In several such cases, splenectomy was performed. The apparent transient improvement may have been due rather to the concurrent administration of blood than to removal of the spleen. Relapse with fatal termination usually followed within days or weeks.

Histological sections from the enlarged spleens usually were characterized by erythroid metaplasia, erythropoiesis, erythrophagocytosis, and pigment accumulation—the same changes seen in cases of infectious anemia. Unfortunately, blood films were not in all instances preserved, but one still available, from a cat splenectomized in 1951, shows the heaviest population of erythrocyte bodies yet encountered by the writer.

While it may well be that the great majority of cases of hemolytic anemia among cats are of this infectious variety, the possibility of erythrocyte destruction due to antigen-antibody reactions, toxic agents, or other unknown factors must not be overlooked. One such instance was provided by a 2-month-old, male kitten presented in a comatose condition with chalky mucous membranes, subnormal temperature, and urine of "port wine" appearance. It had been quiet for the previous 24 hours and was found shortly before admission lying in a pool of red urine, with white foam about its mouth. It was impossible to obtain an adequate blood sample, but a stained film showed the characteristics of a peracute hemolytic anemia, with no erythrocyte bodies recognizable. Exhaustive inquiry elicited only one fact with a possible bearing on the illness: gasoline for a toy airplane was kept about the house. Immediate improvement followed administration of blood, the urine began to clear, and the kitten was discharged in six days. One month later, however, the owner reported, the kitten suddenly became ill "in the same way" and "threw up blood," dying within a day. It was not brought to the hospital for necropsy.

Finally, it may be noted that hemolytic anemia, often with hyperactivity of the spleen, occurs in some leukemias and in disturbances of lymphoid tissue both ma-

lignant and otherwise.[13] One unusual case illustrates the difficulties of diagnosis. Progressive leukopenia, thrombocytopenia, and hemolytic anemia were the findings in an 11-year-old, castrated male cat with marked splenomegaly. The tentative diagnosis of splenic pancytopenia[1,4] seemed to be confirmed when splenectomy was followed by an immediate rise in hemoglobin, leukocytes, and platelets. Two weeks later, however, the cat was returned to the hospital with signs of liver failure, and it was destroyed. Microscopic examination of the spleen, liver, bone marrow, and other tissues revealed infiltration with a lymphoid cell of reticulum type.

III. Decreased Production of Erythrocytes

As with man and other animals, the great majority of anemias in cats are due to decreased erythrocyte production. It would seem, if one may judge from the particular group studied, that while this decrease may in some instances be associated with lack of substances necessary for cell formation, it most often results from some inhibitory influence.

A) Deficiencies

It may some day be shown that deficiencies of minerals and vitamins play a substantial role in the anemias of cats but, because little reliable experimental work has been done to date in cat nutrition, the influence of dietary factors on hematopoiesis is not yet clear. As for clinical evidence, neither in blood findings nor in therapeutic response did the group of animals studied at Angell Memorial Hospital afford substantial evidence of deficiency anemias.

a) Deficiency of Erythrocyte-Maturing Factor.—Prominent among the deficiency anemias of man are the so-called "macrocytic" group, in which an arrest in maturation results in the presence of abnormally large erythrocytes (macrocytes), basophilia, and unusual numbers of nucleated forms, some very primitive (megaloblasts). Normally, it is believed, an extrinsic factor in food is acted on by an intrinsic factor of the stomach wall to produce an erythrocyte-maturing substance which is stored in the liver. Some disturbance in this process occurs in man in pernicious anemia, on inadequate diets (nutritional and tropical anemias), in gastrointestinal disorders resulting in achlorhydria or faulty absorption (e.g., sprue, malignancies), and in liver disease. Clinical experience, as well as work with laboratory animals, has shown that such anemias often respond dramatically to improved diet, liver, B_{12}, or folic acid.

There is as yet little experimental evidence for the effect of such deficiencies in the cat. Anemias associated with niacin or folic acid deficiencies in cats on deficient diets, to which sulfonamides were added, have been reported by Da Silva[5] and Da Silva *et al.*[6] In the case of the folic acid deficiency, the anemia was of the macrocytic type and accompanied by leukopenia.

In the group of cats studied at Angell Memorial Hospital, while no striking instances of specific response to liver, B_{12}, or folic acid were seen, anemia of the macrocytic type was recognized in several patients with gastrointestinal disorders, such as gastric fur ball, chronic pancreatic disease and, notably, liver impairment.

In the latter group, 1 cat, a 4-year-old castrated male, manifested a progressive anemia for over four months, with macrocytosis, evidence of attempted erythrocytic regeneration, and leukopenia. It finally died with symptoms of liver failure. Necropsy disclosed that this was due to diffuse lymphosarcomatous infiltration of the organ, and lymphoid tumors were present in the intestine and marrow as well. The unmistakable recognition in the erythrocytes of bodies suggestive of infectious anemia complicated the diagnosis.

Striking macrocytosis was observed in a 16-year-old castrated male which had been failing in strength and losing weight for over a year. The cat was severely anemic, and its ravenous appetite and soft, grayish stool suggested pancreatic disease. Transient improvement followed blood transfusion, and the cat was discharged with a multipurpose hematopoietic preparation to be given at home. However, a month later, it was again anemic and was destroyed. Necropsy disclosed chronic hepatitis and chronic inflammation and fibrosis of the pancreas. The total leukocyte count was in the low normal range, and the hemoglobin was 5 Gm. per 100 cc. of blood. The blood film (fig. 3b) was characterized by great variation in the size of the erythrocytes, with an abundance of very large ones, some basophilic. A few normoblasts

were present. The bone marrow was hyperactive, with a tremendous number of mitotic figures. The predominant cell was a "blast," thought to be a precursor of the myeloid series, since the most numerous of the maturer cells were granulocytes, with myeloid development traceable as far as the stage of stab cell, representatives of which were rare. Erythroid activity was also vigorous, with active centers consisting of primitive erythrocyte forms developing as far as normoblasts of the less mature type. Megaloblasts were numerous. Megakaryocytes were infrequent.

b) Iron Deficiency.—Except in anemias associated with heavy flea infestation, iron deficiency resulting from chronic blood loss due to parasitism is not prominent among cats of the Boston area. In the group under study, hookworms were incriminated in only 3 cats; 1 responded well to worming and iron therapy but, in the other 2, the anemia proved refractory despite vermifuges and general hematinic treatment. Severe coccidiosis was associated with anemia in 2 cats; in 1, the hemoglobin was 7 Gm. per 100 cc. of blood and, in the other, in which chronic liver disease and intestinal toxoplasmosis were present as well, the hemoglobin was 5 Gm. per 100 cc. of blood.

Severe anemia occurred in several cats when a fur ball, lodged in the stomach, produced ulceration of the mucosa, and iron deficiency resulted from chronic blood loss and impaired nutrition. One such cat, a long-haired, 2-year-old male, was presented with chalky mucous membranes and close to death. A blood film showed the small, pale cells characteristic of iron deficiency (fig. 3c). Although blood transfusions kept the cat alive, its hemoglobin did not rise substantially until it had vomited a large blood-streaked mass of fur, and iron therapy had been started.

It would seem unlikely that iron deficiency of purely dietary origin would often be encountered in cats, except when an owner or animal observes certain fetishes in regard to food. For example, a diet consisting largely of cooked vegetables with occasional helpings of boiled meat produced a severe anemia in an otherwise husky tomcat. Although a number of deficiencies would seem to have been involved, the hospital ration of horse meat, together with injections of liver and B factors, did not raise the hemoglobin level materially; administration of iron, however, produced immediate improvement.

Although uncomplicated iron-deficiency anemia did not appear to be prominent in the particular group of animals studied, it is well to remember that, even when parasitism and other blood loss are not present, iron deficiency may be a factor if there is decreased protein intake or impaired absorption, and also that the metabolic disturbances associated with severe local or systemic infections may result in iron deficiency.[14]

c) Endocrine Deficiency.—Anemias associated with decreased function of the anterior pituitary and thyroid do not as yet appear to have been recognized in the cat.

Legends for Figures 3a, 3b, 3c, 3d on Opposite Page

Fig. 3a—Infectious hemolytic anemia in a 3-year-old, male cat. Tiny, dark-staining bodies are just distinguishable on several erythrocytes (upper right). Vigorous regenerative activity by the bone marrow is indicated by the presence of young forms of the erythrocyte series—several large basophilic cells and a normoblast (erythrocyte with small, deeply staining, homogeneous nucleus and bluish cytoplasm, lower right). Monocytes (see center) are frequently increased. The hemoglobin was 2 Gm. per 100 cc. of blood; leukocytes, 17,000 per cubic millimeter of blood. x 950.

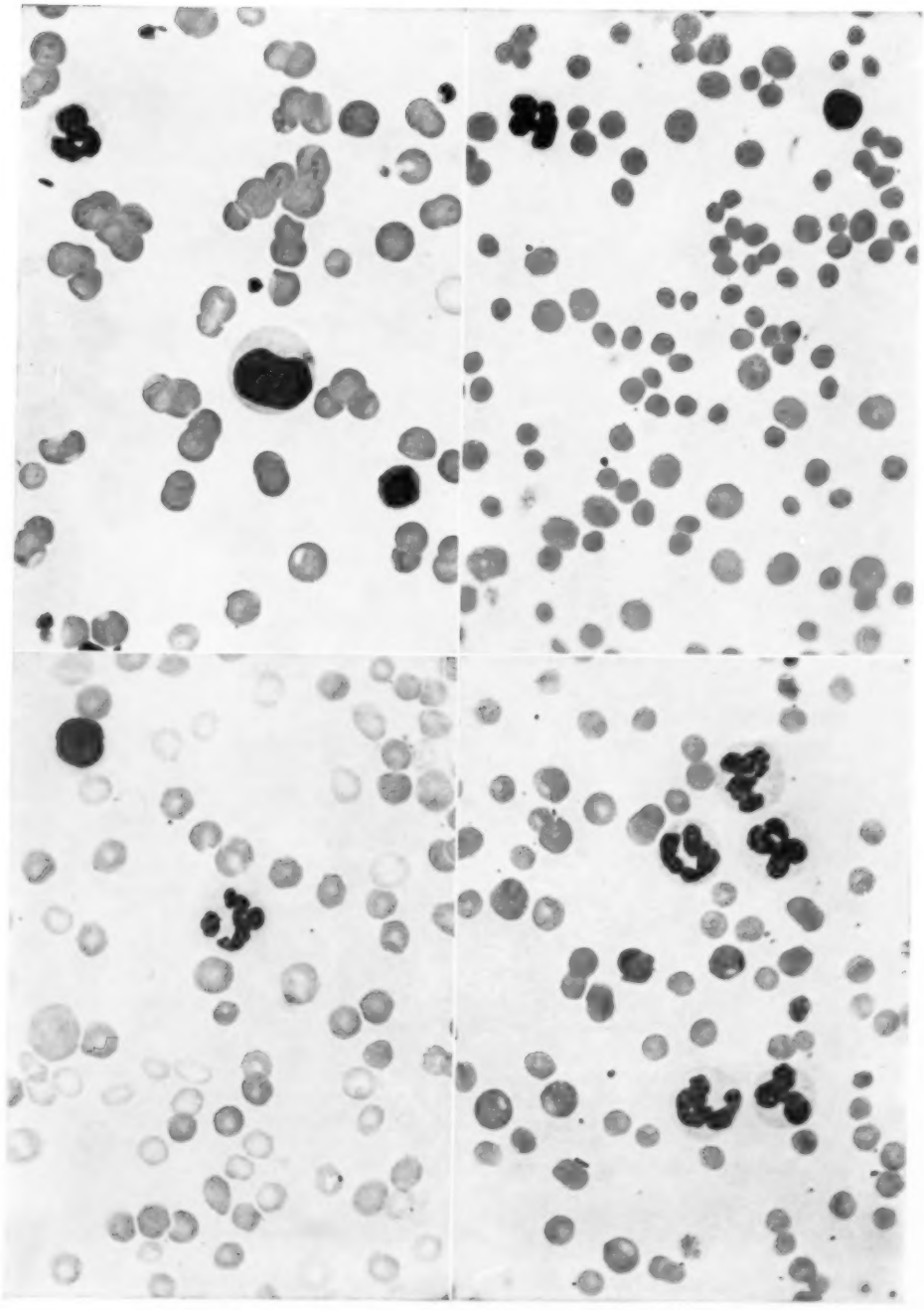
Fig. 3b—Macrocytic anemia associated with chronic disease of the liver and pancreas in a 16-year-old, castrated male cat. The number of large erythrocytes (macrocytes) is striking. Platelets are decreased. The hemoglobin was 5 Gm. per 100 cc. of blood; leukocytes, 6,000 per cubic millimeter of blood. x 950.

Fig. 3c—Iron-deficiency (hypochromic, microcytic) anemia, resulting from gastric fur ball with ulceration in a 2-year-old, male cat. The small, very pale cells are characteristic. Numerous large basophilic erythrocytes are indicative, however, of continued marrow activity. The hemoglobin was 3.5 Gm. per 100 cc. of blood; leukocytes, 15,000 per cubic millimeter of blood. x 950.

Fig. 3d—Systemic infection, recovery phase, in a 3-year-old, male cat. In the earlier stage, erythrocyte formation was depressed, but it is now resumed, as evidenced by several large basophilic cells and the normoblast (center). Neutrophils are numerous and large platelets abundant. The hemoglobin was 3 Gm. per 100 cc. of blood; leukocytes, 25,000 per cubic millimeter of blood. Such a blood picture might easily be taken for that of infectious hemolytic anemia.

a

b



c

d

B) TOXIC INHIBITION

Anemia may result from exposure to toxins of external origin, such as a wide variety of chemical substances, or from toxins produced within the body, as in infection, uremia and, according to some, widespread malignancy. There is great variety in the response of the blood-forming elements. Erythrocyte or granulocyte formation, or both, may be profoundly depressed, with little or no evidence of regeneration, or either series may give evidence of an effort to compensate for the damage done by the depressing agent.

a) Chemical.—Among the chemical substances which may inhibit blood formation are metals such as lead and mercury, benzol and numerous other coal tar derivatives such as certain antipyretics and the sulfonamides, various insecticides, organic arsenicals, hydrocarbons such as are used in insecticides, and the antibiotics, streptomycin and chloromycetin.[9]

In view of the extreme sensitivity of cats to a variety of substances that do not harm other species, it would not be surprising if some of their refractory anemias were related to toxic materials to which they have been exposed in their environment—on garage and cellar floors, under oil stoves, and in contact with sprayed vegetation or household articles. However, positive identification of a toxic material is not often achieved and, in the group under consideration, lead and mercury were the only substances definitely incriminated. In 2 cats with refractory lead poisoning, failure of erythrocytic regeneration and leukopenia characterized the blood pictures. One of the cats belonged to a worker in a smelter and was in the habit of licking the owner's hands and arms; the other's history gave no clue to the source of the toxic quantities of lead found in the tissues (fig. 4). In the cat with mercury poisoning, also of unknown source, widespread tissue destruction, involving particularly the digestive tract, liver, and kidneys, led to a septicemia accompanied at first by failure of erythrocyte and granulocyte production and later by a tremendous response of both myeloid and erythroid elements in a vain effort to overcome the infection (fig. 5a and b).

b) Infection.—One receives the impression that in cats infection plays a far more significant role in producing profound anemia than in any other domestic animal. Whether the anemic response is a peculiarity of the cat or whether the infectious agents affecting cats are particularly prone to produce anemia will not be known until marrow activity in both normal and sick cats is extensively studied and an effort is made to relate its changes in infectious disease to the organisms present.

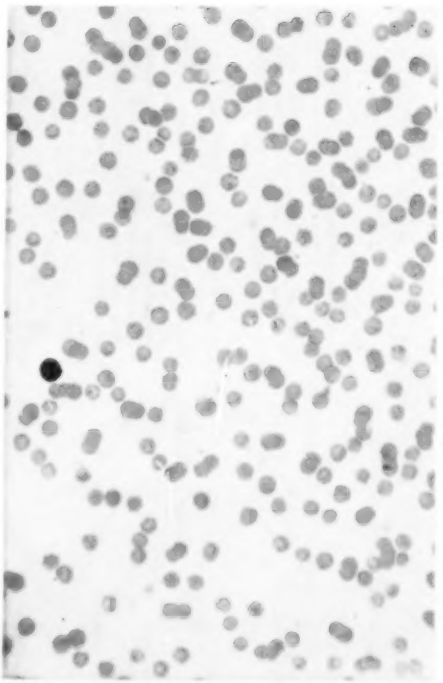


Fig. 4—Lead poisoning in a 4-year-old, castrated male cat. Depression of the bone marrow is manifested by leukopenia and absence of signs of erythrocytic regeneration. The classic feature of "basophilic stippling" of the erythrocytes is not present. The hemoglobin was 6.0 Gm. per 100 cc. of blood; leukocytes, 2,500 per cubic millimeter of blood. x 400.

Among the cases studied, infection (other than that associated with an erythrocyte "parasite") played the principal role in about one half. Changes in the hemoglobin level and leukocyte count as an illness progresses may give some clue to prognosis and response to therapy, but it is only by observation of the stained film that one becomes aware of the fascinating variety of erythrocyte and leukocyte responses in the different types of infection.

Systemic infections in which anemia is

TABLE I—Physiological Classification of Anemia*

Type of anemia	Bone marrow	Erythrocytes	Leukocytes	Platelets	Pigment metabolism	Treatment
I. Acute and subacute blood loss or internal bleeding without iron deficiency.	Hyperactive; hypercellular.	No immediate change after acute loss, subsequently reticulocytosis and macrocytosis; occasional nucleated forms.	Leukocytosis after acute blood loss.	Increased.	Sometimes moderate jaundice with internal bleeding.	Transfusions or other fluid therapy to restore blood volume.
II. Increased destruction and production of erythrocytes, i.e., hemolytic anemias (infections with bacteria and blood parasites; chemicals, such as lead, naphthalene, certain compounds of benzol and phenol, anilin, sulfonamides; snake venom; autoagglutinins and autohemolysins; thermal injury; incompatible transfusions; certain liver diseases; some leukemias).	Hyperactive; hypercellular (in overwhelming or chronic infection marrow activity may decrease, and anatomical or physiological aplasia result).	Normal in hemoglobin content; may be enlarged; polychromasia, reticulocytosis, nucleated cells, particularly in acute hemolysis; basophilic stippling in lead poisoning.	Increased in acute hemolysis, sometimes to point of "leukemoid" reaction; may be normal in chronic condition.	Normal or increased.	There may be hemoglobinemia and hemoglobinuria, or increased bilirubinemia and high fecal urobilinogen; in chronic hemolysis fecal urobilinogen may be increased but not plasma bilirubin.	Avoidance or removal of cause; transfusion; splenectomy effective in certain hemolytic anemias in man.
III. Decreased production of erythrocytes.						
A) Deficiencies.						
a) Deficiency of erythrocyte-maturing factor of liver (protein deficiency, certain gastrointestinal disorders, liver disease, deficiency of B factors).	Hypo- or hypercellular.	Erythrocyte volume and hemoglobin content normal or increased ("macrocytic" anemia); immature forms sometimes present.	Often leukopenia and relative lymphocytosis.	Normal or decreased.	Bilirubin may be elevated in liver disease.	Adequate protein, liver, B_{12}, folic acid.
b) Iron deficiency (chronic blood loss, deficient diet, decreased absorption).	Hypoactive.	Erythrocyte volume and hemoglobin content decreased, variation in shape and size; reticulocytes decreased or normal, occasional nucleated forms.	Sometimes slightly increased; or decreased if anemia is severe or prolonged.	May be slightly increased; or decreased if anemia is severe or prolonged.	Normal or lowered plasma bilirubin and fecal urobilinogen.	Prevention of blood loss, iron.

c) Endocrine deficiency.						
1) Thyroid.	Hypo- or hyperactive.	Normal or enlarged.	Normal or depressed.	.....	.....	Thyroid.
2) Anterior pituitary.	Hypoactive.	Cell size and hemoglobin content variable, decreased reticulocytes.	Sometimes leukopenia and eosinophilia.	.....	.....	Anterior pituitary.
B) Toxic inhibition.						
a) Chemical (e.g., benzol and other coal tar derivatives, heavy metals, certain volatile insecticides, organic arsenicals, certain antibiotics).	Hypo- or hyperactive.	Normal or enlarged.	Often leukopenia; "leukemoid" reaction in mercury poisoning.	Variably decreased.	Variable according to whether there is increased destruction of erythrocytes.	Removal of toxic agent, transfusion.
b) Peracute or chronic infections.	Hypo- or hyperactive.	Decreased size and hemoglobin content, sometimes normal, or enlarged with evidence of attempted regeneration.	Response varies from extreme leukopenia to marked leukocytosis.	Same.	Same.	Elimination of infection, transfusion.
c) Kidney failure.	Usually hypoactive, mildly hypocellular.	Normal or enlarged.	Usually normal, although leukopenia or leukocytosis may occur.	.....	.....	.....
C) Radiation injury.	Aplasia or fibrosis.	Normal.	Leukopenia.	Decreased.	Normal.	Transfusion.
D) Mechanical interference with bone marrow (leukemia, metastatic tumors, granulomas, miliary tuberculosis).	Surviving normal bone marrow usually hyperactive.	Erythrocytes normal or enlarged, variable increase in reticulocytes and nucleated erythrocytes.	Leukopenia, myeloid response, or leukemia.	Variably decreased.	Variable.	Irradiation, chemotherapy, and transfusion.
E) Aplastic anemia ("idiopathic"; due to unknown factors).	Hypo- or hyperactive.	Normal or enlarged.	Leukopenia.	Decreased.	Normal.	Transfusion.

*This table is a composite based on classifications of anemia by Castle and Minot,[2] Wintrobe,[31] Kracke,[17] Ham,[10] Coffin,[3] and others.

prominent are common. Foremost in this group is the virus infection, panleukopenia (infectious enteritis, agranulocytosis, "cat typhoid," "cat distemper"). In the typical case, in which the illness ends rapidly in either death or recovery of the cat, the general depression of marrow activity results in a moderate lowering of the hemoglobin level, but the anemia is by no means so profound and striking as the leukopenia. A characteristic blood film shows endless fields of mature erythrocytes, uniform in size, shape, and pigment content, and with no evidence of accelerated erythrocyte production; it may be impossible to find even a single leukocyte or one may see, at wide intervals, an occasional lymphocyte (fig. 6).

A fair number of cases of panleukopenia are characterized by a prolonged course, development of complicating conditions, or febrile relapses after apparent recovery. In their later stages, it often appears that, while the myeloid elements of the marrow are again able to respond, it is the erythroid element that is most severely affected, so that the picture is one of a rising leukocyte total with neutrophilia, but with no evidence at all of erythrocytic response —a situation perhaps suggestive of secondary bacterial infection. Such cats sometimes respond to antibiotic treatment. An occasional relapse, which is associated, not with fever, but only with pallor, inappetence, and lethargy, seems to result from total inactivity of the marrow, there being neither erythrocytic nor leukocytic regeneration. The prospects in this type of case are poor indeed, for the marrow seems to have been permanently damaged.

Another systemic infection which initially suggests panleukopenia is met with

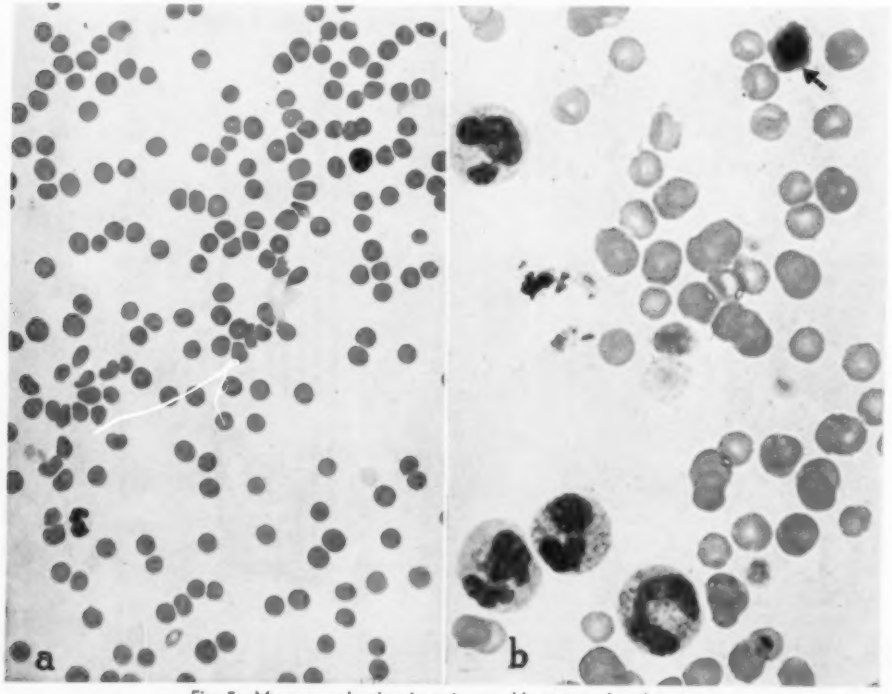


Fig. 5—Mercury poisoning in a 4-year-old, castrated male cat.

a) Massive secondary bacterial embolization at first resulted in leukopenia. The hemoglobin was 2.5 Gm. per 100 cc. of blood; leukocytes, 1,300 per cubic millimeter of blood. x 400.

b) Two days later, the marrow had responded with a tremendous effort to overcome the infection. Nucleated (arrow) and basophilic erythrocytes are present, as well as an abundance of young neutrophils. The hemoglobin was 4.0 Gm. per 100 cc. of blood; leukocytes, 62,000 per cubic millimeter of blood. x 950.

occasionally and would perhaps be recognized more frequently if panleukopenia were diagnosed less casually and followed more vigilantly. It has been seen in cats which have recovered from, or been exposed to, or vaccinated against, panleukopenia, and which ranged in age from 1 to 12 years. Its course has been from several days to three weeks and is usually characterized, until almost the end, only by partial anorexia and mild depression. Persistent, high fever, responding to no antibiotics, persistent and progressive leukopenia, an initially moderate but slowly progressive anemia, and a mild terminal jaundice are the outstanding features. Most of the cats in which the infection was recognized have died. At the time of death, the leukocyte counts in some have been less than 1,000 per cubic millimeter of blood and the hemoglobins in the neighborhood of 4 to 6 Gm. per 100 cc. of blood. Hepatitis is the microscopic finding. With the absence of leukocytes and the lack of evidence of erythrocytic regeneration, blood films are similar in appearance to those in panleukopenia.‖

Another group of systemic infections which may also at first suggest panleukopenia are the overwhelming bacterial infections in which leukopenia is present at the time the patient is first seen. It is likely that this group, too, would appear considerably larger if, before a diagnosis of panleukopenia were made, careful consideration were given to a cat's age, the probability of immunity to panleukopenia, history, symptoms, and the clinical and hematological course of the disease. These animals may be of any age or condition and have frequently been ill and febrile for some time before admission to the hospital. Jaundice and profound anemia often accompany the leukopenia. Blood culture in several instances has isolated *Escherichia coli*, Proteus, or a paracolon. Despite blood transfusions, antibiotics, and supportive treatment, and even when the crisis seems to be past, many of these cats die; necropsy suggests that irreversible damage has occurred in the parenchymatous organs, particularly in the liver. The cats frequently live for some days, however, and the blood studies often show a heroic effort on the part of the bone marrow to overcome the infection. Within two or three days, the leukocyte count may rise well above normal, and the tide of immature and even primitive myeloid cells may be associated with immature erythrocyte forms, giving evidence of a corresponding effort at erythroid regeneration (fig. 3d). Obviously, the blood film at this stage very closely resembles that of an acute hemolytic anemia, and one must guard against the possibility of an erroneous diagnosis of infectious hemolytic anemia.

In 2 anemic cats with acute systemic febrile disease, generalized toxoplasmosis was recognized at necropsy. Formation of both erythrocytes and granulocytes was depressed and jaundice was present.

Localized bacterial infections accompanied by severe anemia were far more numerous in the group than systemic infections and included such conditions as abscessed and necrotic bite wounds, chronic toe infections, fusospirochetal stomatitis,

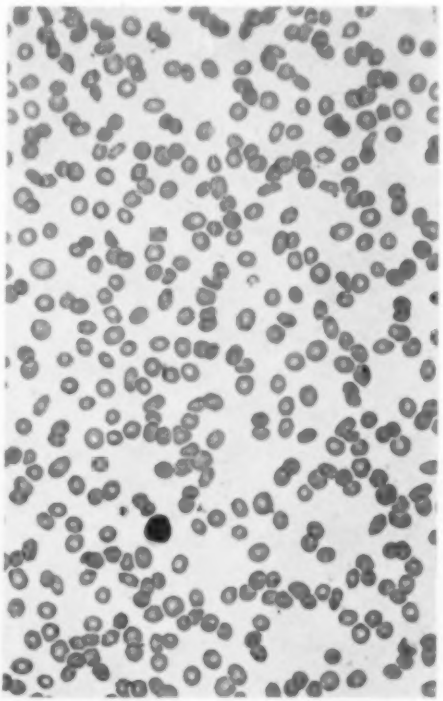


Fig. 6—Panleukopenia in a 1-year-old, female cat. Endless fields of mature and uniform erythrocytes are characteristic. Leukopenia is marked, only an occasional lymphocyte (lower left) appearing. The hemoglobin was 6 Gm. per 100 cc. of blood; leukocytes, 2,500 per cubic millimeter of blood. x 400.

‖A study of this entity is in progress.

sinusitis, tonsillitis, fibrinous pleuritis and peritonitis, metritis, hemorrhagic enteritis, pancreatitis, liver abscess, and acute, subacute, and chronic hepatitis. Pyothorax, an entity with a peculiar affinity for cats, is not generally accompanied by severe anemia (in 1 unusual case, however, the infective organism was a hemolytic Streptococcus which invaded the blood stream and caused marked anemia and jaundice). Pyometra, likewise, is rarely accompanied by profound anemia; but several instances of metritis were encountered which seemed to have been preceded by some type of systemic infection that resulted in abortion. In these, the hemoglobins were exceedingly low.

In the conditions listed above, the erythrocytes, characteristically, are predominantly mature and uniform, with little or no evidence of accelerated formation. Occasionally, there is considerable variation in the cell size, owing to the presence of numerous small cells deficient in pigment, a characteristic of iron deficiency which is believed often to accompany the metabolic disturbances resulting from infection.[14] In a minority of cases, definite evidence of erythrocytic regeneration was observed, a phenomenon to be interpreted as a sign of defensive reaction to the invading agent or as evidence of the presence of a hemolytic organism.

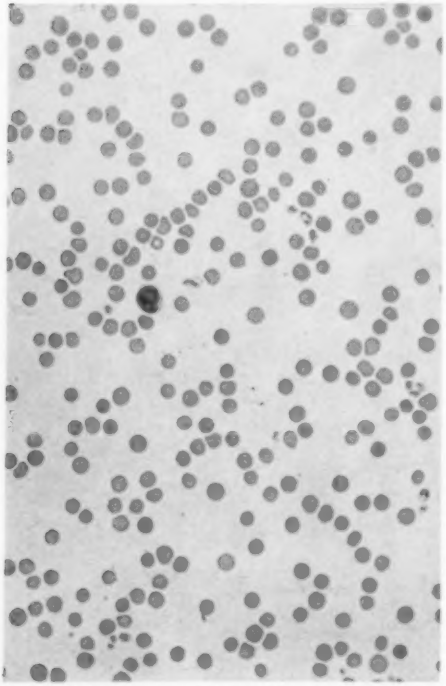


Fig. 7—Chronic hepatitis in a 19-year-old, castrated male cat. With liver disease, the peripheral blood is frequently characterized by leukopenia and absence of signs of erythrocyte formation. The hemoglobin was 3 Gm. per 100 cc. of blood: leukocytes, 5,000 per cubic millimeter of blood. x 950.

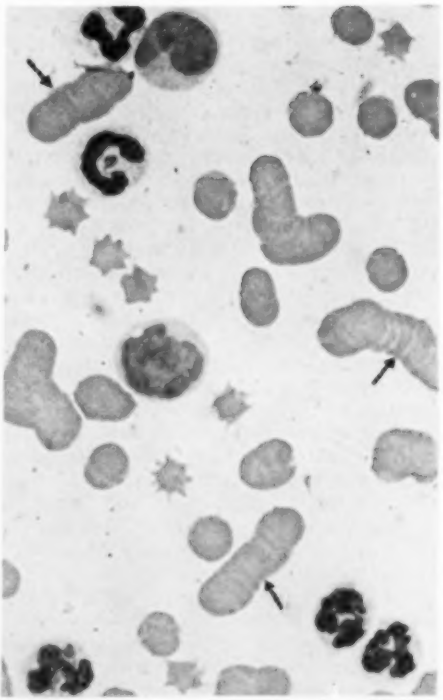


Fig. 8—Liver abscesses in a 9-year-old, female cat. A progressive anemia with no signs of erythrocytic regeneration was accompanied by a rising leukocyte count. Rouleaux formation (arrow) is marked, as it often is in severe liver disease. Neutrophils, many of them immature, are abundant. The hemoglobin was 5 Gm. per 100 cc. of blood; leuckocytes, 90,000 per cubic millimeter of blood. x 950.

Tremendous variety is observed in the leukocytic responses. Moderate to marked increase of neutrophils occurs in the majority. Severe infection of some duration may depress myeloid activity, as was the case in several extensive and necrotic wound infections and in a number of cases of hepatitis, of both acute and chronic varieties (fig. 7). On the other hand, there may occasionally be spectacular myeloid

responses, even to the point of the so-called "leukemoid reaction" observed in 2 cats with necrotic mouth infection and liver abscesses, respectively (fig. 8). Although the neutrophil may be the leukocyte primarily involved, one is often struck by the appearance of considerable numbers of large mononuclear cells. Small, compact lymphocytes of the "textbook" type are in the minority in the cat, and many of the lymphocytes are so large and so variable in morphology that it is difficult to distinguish them from monocytes.

This observation regarding the presence of unusual types of mononuclear cells may serve to introduce still another group of anemias associated with infection, *i.e.*, systemic infections in which lymphocytes are the predominant leukocyte. The most striking example was provided by a 4-year-old, castrated male cat with anorexia and a fever lasting three weeks, despite a variety of antibiotics. For over two weeks, the hemoglobin remained at about 4 Gm. per 100 cc. of blood and the leukocyte count within the normal range. The stained films disclosed anisocytosis and basophilia, with numerous Howell-Jolly bodies and some nucleated erythrocytes. Most remarkable, however, was the predominance among the leukocytes of large lymphocytes and lymphoblasts (fig. 9). Although the cat was never critically ill, it was ten days before its appetite returned, the fever subsided, and the blood began to return to normal.

A similar course and response were observed in a 2-year-old male with anorexia, persistent, high fever, and transient lymph node enlargement. For one week before recovery began, the hemoglobin remained at about 3 Gm. per 100 cc. of blood, although the stained film gave evidence of an attempt at regeneration. Initially, the total leukocyte count was in the normal range, but

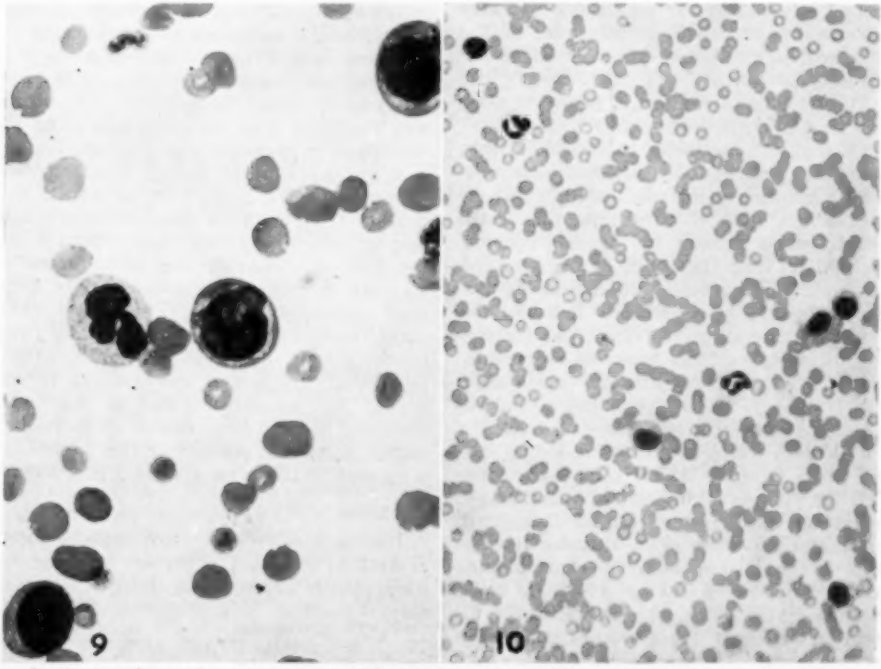


Fig. 9—Lymphocytosis, acute systemic infection in a 4-year-old, castrated male cat. Large lymphocytes constitute a majority of the leukocytes. Very large platelets are numerous. The hemoglobin was 4 Gm. per 100 cc. of blood; leukocytes, 12,000 per cubic millimeter of blood. x 950.

Fig. 10—Lymphocytosis, mild chronic infection in a 2-year-old male cat. The anemia is moderate. Rouleaux formation is marked. Intermediate lymphocytes constitute 70 per cent of the leukocytes. The hemoglobin was 10 Gm. per 100 cc. of blood; leukocytes, 10,500 per cubic millimeter of blood. x 350.

with 55 per cent intermediate or large lymphocytes. A few blast cells and dividing lymphocytes were observed. After a transient rise in the leukocyte count, with a neutrophilia, there was a return to a normal total, again with lymphocytosis. When the cat was discharged, in two and a half weeks, the hemoglobin was rapidly rising toward normal but the lymphocytosis persisted.

Milder illness, likewise accompanied by lymphocytosis, has been seen in a number of young adult male cats. The owners frequently have difficulty in naming specific symptoms, remarking only that for some days, or even weeks, the cat has been less active, eaten less than usual, and lost weight. In 1 or 2 cases, a chronic cough was mentioned and, in 1 cat, there was lymph node enlargement. In this group, the temperatures were only slightly above normal. Blood findings were hemoglobins in the borderline zone between anemia and low normal and slightly or moderately elevated leukocyte counts, with lymphocytes of the intermediate or larger types far more numerous than normal (fig. 10).

All the cats in the group recovered; the appearance of response to antibiotics, which were used in practically all instances, may have been coincidental. Medical hematologists consulted about the blood films have been struck with the resemblances to the hematological picture in infectious mononucleosis of man (however, in 2 cats tested, heterophil antibodies could not be demonstrated). Until more evidence accumulates, it is probably safest to resist the temptation to interpret these cases as representative of a single entity and to bear in mind that lymphocytosis may conceivably be the feline response to a variety of agents.

c) Kidney Failure.— Chronic kidney disease with gradual failure is also accompanied by toxic inhibition of erythrocyte formation. Six elderly cats in the group under study had moderate anemias attributable to this condition. The hemoglobins ranged from 5 to 8 Gm. per 100 cc. of blood and the erythrocytes were, in general, uniform in size and shape with normal pigment content. The leukocyte counts were either normal, or moderately elevated, with some tendency to neutrophilia.

d) Malignancy.—It is not certain whether malignancy may in itself, by some toxic action, depress erythrocyte formation or whether this effect results solely from impaired function of the organs involved. Anemias associated with obvious neoplasms have not been included in this study but, in 3 cats, tumors were ultimately found to be responsible for persistent anemia.

In a 1½-year-old female, a progressive anemia believed to be related to pleurisy proved to be due to lymphosarcoma of the liver and thymus. In an 11-year-old castrated male with no definite symptoms except weight loss and moderate anemia, a bronchogenic carcinoma was found.

In a 13-year-old female, profound anemia, enlargement of the liver and spleen, and the presence of a small amount of ascitic fluid were the outstanding symptoms. The owner believed that the cat had been pregnant until several days before, and that a miscarriage had occurred. Slight fever and a leukocyte count of 45,000 per cubic millimeter of blood, with monocytosis, suggested infection. Shortly after admission, uncontrollable uterine hemorrhage began, and a laparotomy was done in the hope of establishing a diagnosis and controlling the bleeding. The liver and spleen were both enlarged, diffusely infiltrated with pale tissue, and coated with fibrin. The uterus was distended with unclotted blood and the ovaries were enlarged and knobby. The cat was spayed and the spleen was removed. Throughout the operation, bleeding was profuse from even the smallest vessels and, despite careful ligation and suturing, the cat died of abdominal hemorrhage within an hour. Necropsy disclosed a minute, hitherto unnoticed mammary carcinoma from which metastases had spread to the liver, lungs, spleen, and other sites. A corpus luteum of pregnancy was present in one ovary. The excessive bleeding may have been due to liver impairment, or to defibrination similar in etiology to that associated with certain obstetric disasters in women.[11]

C) Radiation Injury

Instances of bone marrow damage due to radiation were not observed and are not likely to be encountered except in experimental work.

D) Mechanical Interference with the Marrow

Although replacement of marrow by metastatic tumors and granulomas is common in man, no instances of this in cats have come to the writer's attention. In 12 cats, however, leukemic involvement of the bone

marrow proved ultimately to be responsible for decreased erythrocyte formation. One instance of myeloma and two each of myeloid and monocytic leukemia were encountered; the rest were of the lymphoid type. In none of these cats was the disorder readily recognizable from the stained blood film.

The symptom common to all was a profound, refractory anemia, either of the normocytic, normochromic variety or with characteristics of a regenerative effort, such as macrocytosis, basophilia, and the presence of nucleated forms. In most cases, the leukocyte counts were in the normal range or depressed, and it was only the recognition of an occasional abnormal cell that led to identification of the condition. In several of the cats, complicating conditions, such as severe stomatitis, extensive necrotic skin wounds, liver enlargement and jaundice, or kidney failure—all attributable, in retrospect, to the leukemia—were at first assumed to be the cause of anemia and thus delayed or prevented recognition of the primary condition.**

Since leukemia occurs frequently in cats, one must constantly bear in mind that it may masquerade in a variety of disguises, that the total leukocyte count may be of no assistance, that even a stained smear may not provide a positive diagnosis, and that the relentlessly progressive anemia may offer the sole grounds for suspecting the true nature of the illness.

E) "Aplastic" Anemia

Although the term "aplastic" is sometimes loosely applied to any anemia in which there is toxic or physical inhibition of both erythrocyte and leukocyte formation, it is more properly restricted to cases in which such a dyscrasia exists without discoverable cause.

Two young adult cats suffered from baffling anemias of this type. Both were well fed, without previous or concurrent illness (except that 1 had a light hookworm infection), and without any history or sign of exposure to toxic substances. Both were kept alive by blood transfusion for many weeks, while trial was made of a variety of hematopoietic agents, but leukopenia and failure of erythrocytic regeneration persisted. At necropsy, the bone marrow showed deficiency of both erythroid and myeloid precursors, but no cause for this situation could be discovered.

**These cases will be reported in a forthcoming study of feline leukemias.

Conclusions

Of the entire group of 120 cats, about one fifth recovered. With such mortality, it is clearly essential that, before therapy obscures the picture, a general impression be formed as to the type of an anemia in order to determine the prospects for successful treatment. Notwithstanding limitations of time and laboratory facilities, it is an unequivocal fact that, in addition to careful history-taking and examination, certain fundamental diagnostic procedures, notably examination of the stained blood film, are indispensable for conscientious evaluation and management of an anemia. If these basic procedures, together with observation over several days, do not suggest a diagnosis, it may be necessary to present to an owner the need for expert consultation, if a case is to be handled otherwise than empirically.

Of the three broad physiological types of anemia, that of acute blood loss is least often represented among cats; although internal hemorrhage due to injuries is encountered occasionally, surgical hemorrhage and internal bleeding from vascular tumors are uncommon.

Hemolytic anemia, on the other hand, is frequently encountered, the increased erythrocyte destruction resulting in a blood picture of accelerated erythrocytic regeneration and being often accompanied by fever, splenomegaly, and jaundice. Most of these cases appear to be of the infectious type described by Flint and Moss[7] and Flint[8] and are characterized by the appearance of small, dark-staining bodies on the surface of the erythrocytes. Almost a quarter of the anemias studied were of this variety and its recognition is important since, if there are no complications, a fair number of recoveries may be expected.

To the third group, that of decreased erythrocyte production generally, belong the great majority of feline anemias. Deficiency anemias, to judge from the particular animals studied, would appear not to be common. Although morphological resemblances to the nutritional macrocytic anemias of man were seen in a few cases of digestive impairment and liver disorder, there was no clear response to administration of liver or B factors. Iron deficiency was morphologically demonstrable only in a

few instances of stomach ulcer due to fur ball, a case of malnutrition resulting from a boiled diet, and a very few cases of parasitism. The chief cause of deficient erythrocyte production would seem to be toxic inhibition of the marrow—in a relatively small number of cases by substances such as heavy metals or the metabolic toxins of uremia and malignancy, but principally by the presence of infection.

It is most important that the veterinarian become familiar, through study of the blood film, with the tremendous variety of erythrocyte and leukocyte responses associated with the different types of infection, viral and bacterial, systemic and local, for it is in this group that the majority of his successes will come. Except with viral infections and deep-seated, long-standing conditions, such as lung abscess, liver abscess, or chronic liver disease, he will often find, by an orderly trial of antibiotics, one that will achieve a dramatic drop in fever, return of appetite, and rise in hemoglobin.

As mechanical inhibitors of erythrocyte production by the marrow, blood malignancies of aleukemic type must be recognized as of considerable importance in the cat, since about 10 per cent of the anemias studied were in this group. Because these dyscrasias may be disguised by a variety of secondary manifestations, with no telltale cells being released into the blood stream, their presence may be suggested only by leukopenia and progressive anemia.

Infection would appear from this study to be far more frequently the cause of profound anemia in cats than in the other domestic animals. Why, will not be clear, until the infectious agents themselves are better known and possible peculiarities of the feline response to infection are investigated.

Although deficiencies of dietary factors appeared to assume a minor role in the cases studied, it is possible that experimental work in feline nutrition may yet assign to them a primary part in anemias which now seem to be due to other causes.

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Human Leptospirosis in Malaya.—When 83 patients with serologically confirmed leptospirosis were subjected to comparative treatments, at six-hour intervals—penicillin to some, chloramphenicol to others—the course and signs of the disease were similar to those of the untreated control group.—*J.Am.M.A., March 24, 1956.*

Psittacosis in North Carolina

Six cases of human psittacosis in three adjoining North Carolina counties were reported in March. Four affected members of one family had been exposed to 2 parakeets. The other cases were an owner of a parakeet aviary and a worker in another. In both cases, when virus was recovered, all of the birds were destroyed. Infection has been identified in parakeets in five other counties.—*U.S. Pub. Health Serv., March 8, 1956.*

Whither "National Board" Examinations in Veterinary Licensure?

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IN 1954, three state veterinary examining boards—California, Connecticut, and Kansas—used objective tests (multiple-choice questions) for the first time in an organized way as part of their licensing procedures; the tests were taken by 210 candidates.

In 1955, the tests (which had been revised in the interim) were used again by the same three boards and by five others—Alabama, Maryland, Minnesota, Oregon, and South Dakota; 501 candidates were examined.

In 1956, it is expected that these eight boards, as well as a few others, will use the objective tests instead of the traditional essay-type examinations for the written part of their licensing procedures; in fact, three boards (California, Minnesota, and Montana) have already used the objective tests in their midwinter examinations of 48 candidates.

In all cases, the objective tests used were those developed jointly by the National Board of Veterinary Medical Examiners and Professional Examination Service.[1,2]

So far, a total of 759 candidates for veterinary licensure have been tested by this method of measuring the candidates' knowledge of veterinary medical subject matter; thus, it has had a good "trial run." Almost without exception, the respective state boards have used oral and practical tests in conjunction with the objective tests in determining finally each candidate's qualifications to practice veterinary medicine.

INCREASING ACCEPTANCE OF OBJECTIVE TESTING

In the past few decades, objective tests in one form or another have been used to a markedly increasing extent and for diverse purposes: by schools to evaluate academic progress; to select students for special training; for college entrance; by the armed services to determine intellectual fitness for service and to help in placement and assignment; and by government and industry to select and promote employees and assign them to work best suited to their abilities.

The use of this technique in evaluation of the adequacy of professional training and competency to practice is more recent. It is now being used by professional schools, by licensing boards, and by specialty boards in many professions.

This increasing interest in, and acceptance of, objective tests is explained by the several outstanding advantages of the method as compared with essay-type, written examinations.

SOME ADVANTAGES OF OBJECTIVE TESTING

As pointed out by Drs. Long, Payne, Zeissig, and others at the conference on veterinary licensure last year,[2] objective testing has a number of advantages which merit repetition:

1) The great care used to secure valid questions. These are solicited from veterinarians who are recognized authorities in their respective fields and are reviewed by others before being accepted for the master file; they are also appraised as to difficulty.

2) The outline of the projected examination and its actual construction is performed by the Examination Committee (5 persons) of the National Board in consultation with staff members of Professional Examination Service (P.E.S.). From the large number of item-questions on file, sufficient numbers are pulled, reviewed, and finally selected to furnish the 435 items in the examination. These are distributed as to subject matter according to the pattern already agreed on (*see* table 1).

3) The wide coverage of subject matter makes it possible to explore a far larger area of the examinee's knowledge of veterinary medicine than does the essay type of test; at the same time, the examinee has greater opportunity to demonstrate his capacity.

4) Greater accuracy, speed of scoring, and impartiality in grading answer sheets are obtained by the electrical machine-scoring of objective tests. These factors also make the examination scores less susceptible to protest; that is, they are valid and reliable.

5) Objective tests can be continually improved and refined by statistical analyses of the results, *i.e.*, answers selected by examinees, each time the test is used. Questions that are ambiguous, too

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easy, too difficult, or not sufficiently discriminating can be eliminated or revised.

THE 1955 CONFERENCE ON LICENSURE

The preconvention conference on Veterinary Medical Examination and Licensure, held in conjunction with the AVMA meeting in Minneapolis last August, was attended by representatives of most of the examining boards in the United States, a few in Canada, and one territory.

The discussions following the papers and panel presentations showed that there is marked interest in ways and means of improving the standards and methods for professional licensure. The complete proceedings of the conference were published, along with the business sessions of the House of Representatives, as Part 2 of the March 15, 1956, issue of the JOURNAL.

In addition to covering the background and purposes of professional licensure, the origin and current operations of the National Board, the conference program included discussions of trends in, and appraisals of, various examination methods in the fields of both education and licensure, how objective tests are constructed and used, and reports on their use.

EXPERIENCE WITH NATIONAL BOARD—P.E.S. TESTS

The experiences of several state boards in using the National Board-P.E.S. tests one or more times were recited; the attempt to "crack" the tests, apparently made in one state through concerted efforts of a group of candidates to memorize the questions and later reproduce them, was cited.

These efforts were known by the National Board and Professional Examination Service shortly after they had occurred; in fact, measures to prevent or to remedy any such future attempts had been discussed prior to the conference, and the incident was brought out early in the conference program by representatives of the National Board and Professional Examination Service as well as by one state board representative.

CORRECTIVE MEASURES FORMULATED

As a result of last year's experience, the Examination Committee of the National Board met with representatives of Professional Examination Service last fall to work out measures designed to safeguard the test and prevent or correct any future attempts to crack it. The steps agreed on include:

a) Construction of an alternate examination so that state boards can use either the original form (which is considerably revised each year) or the alternate one. Thus, candidates will not know which test they will encounter in any given state.

b) The time allowed for taking the entire test has been reduced by one-half day. This will still allow candidates ample time to complete the tests but not time in which to memorize any appreciable number of the 435 items or questions.

c) Parts of the tests (*see* outline) can be combined in different patterns by the various state boards.

d) Instructions to state boards will stress the importance of good proctoring, safe-guarding the security of the test documents, and other measures to prevent improper activities of candidates while taking the examinations.

e) As already stated, the National Board-P.E.S. tests have always been revised annually, this being a joint activity of the two groups. This annual revision will be continued, not only for the purpose of inserting new items and material but also to improve the whole examination and keep it up-to-date.

EDUCATIONAL AND INFORMATIONAL PROGRAMS AS ADDITIONAL MEASURES

Because the use of objective tests in veterinary professional licensure is a new departure which appears likely to be used by more and more state boards, it is desirable that veterinary students and other prospective examinees be fully informed as to the exact nature of the tests, how they are administered and scored, and anything else that may help to dispel the mystery and fear of objective tests, if such exist.

It is also felt that, if prospective examinees understand the advantages of objective testing, including the one of machine scoring of their test papers, they will be less inclined to efforts at cracking the test. Such efforts are costly and time-consuming; also hazardous and largely ineffective if the examinations are well proctored.

Apart from being a discredit to themselves and to the profession for which they are trying to qualify, failure to observe the integrity of all steps in the licensing process is fraught with serious implications and consequences to candidates and the protection of their own futures as qualified professional men.

The additional measures agreed on in-

clude talks to veterinary students and the publication of one or more articles on objective testing and its current use by state examining boards.

TALKS TO VETERINARY STUDENTS

In recent months, talks have been given to student groups at several veterinary schools and, before the end of the current academic year, will have been given at all the schools. These have been arranged with the cooperation of the respective deans, sometimes as student chapter programs, at other times for senior and junior students only.

The talks have been given by Mr. Charles B. Frasher, personnel consultant of Professional Examination Service, who has reported great interest on the part of students at schools so far visited. In addition to describing the construction and use of objective tests in veterinary medicine, the students are given an outline of the subject matter covered in them and a 15-item sample set of multiple-choice questions so that they can see the exact nature of the examination. In several instances, one or more representatives of the National Board have been present at these student meetings.

OUTLINE OF REVISED VETERINARY MEDICAL EXAMINATION

As now set up, the National Board-P.E.S. objective test is in three parts. Part A covers anatomy, physiological chemistry, physiology, and pathology. The number of items or multiple-choice questions in part A total 180, distributed as shown in table 1.

Part A of the examination is to be given on the morning of the first day, four hours being allowed for it, e.g., from 8 a.m. to 12 noon.

Part B of the examination covers the subjects of bacteriology, hygiene, parasitology, and pharmacology and therapeutics. It comprises 120 multiple-choice questions distributed as shown in table 1.

Part B is given on the afternoon of the first day, three hours being allowed for it, e.g., from 2 to 5 p.m.

Part C covers physical diagnosis, medicine, and surgery. It comprises 135 multiple-choice questions distributed as shown in table 1.

This part is given on the morning of the second day of the state board examination, three hours being allowed for it, e.g., from 9 a.m. to 12 noon.

The entire examination consists of 435 multiple-choice questions or items, the same number as in the original four-part examination used in 1954 and 1955, now rearranged in three parts.

SAMPLE MULTIPLE-CHOICE OBJECTIVE EXAMINATION QUESTIONS

Following the preconvention conference referred to earlier, Professional Examination Service conducted an exhibit at the Minneapolis auditorium at which the objective testing method was demonstrated. Veterinarians were given a booklet of 15 multiple-choice questions along with instructions as to how they should mark the special answer sheets provided, using a special solid black pencil. The answer sheets were then scored in an electrical test-scoring machine and the score given at once to the veterinarian taking the test. This demonstration of the method attracted great interest; nearly 300 veterinarians took the test.

In the talks at the veterinary schools this year, a similar booklet of sample questions is being distributed to the students attending, so that they may see the exact nature of the objective test in veterinary medicine and understand its use and the scoring of answers. Following are the 15 sample items:

Sample Multiple-Choice Objective Examination Questions

1. Severing the radial nerve as it emerges from the brachial plexus results in:
   1. Paralysis of the extensors of the shoulder joint.
   2. Atrophy of the supraspinatus and infraspinatus muscles.
   3. Paralysis of the extensors of the elbow, carpal and digital joints.
   4. Paralysis of the main flexors of the carpus.
   5. Paralysis of the serratus ventralis.

2. A urine specimen collected from an excitable dog in the veterinarian's office is positive for glucose but shows no other abnormality, and a blood sample taken at that time shows a glucose level of 120 mgm. per 100 cc. of whole blood. Later samples of urine show no abnormality and blood glucose values range around 90 mgm. per 100 cc. of whole blood. It is probable that:
   1. Impaired renal tubular reabsorption is present.

2. The animal is suffering from diabetes mellitus.
3. A tumor of the adrenal gland is present.
4. Adrenalin release has caused glycogen breakdown.
5. The animal is suffering from a brain injury.

3. Sinus arrhythmia, a normal fluctuation in cardiac regularity, is common in normal quiet dogs and is due to:
1. Alternate increase and decrease of vagal activity.
2. A-V bundle-branch block.
3. Intrathoracic pressure changes occurring during normal respiration.
4. Increase and decrease in cardiac muscle tone.
5. Variations in intensity of sympathetic stimulation.

4. Which one of the following changes in blood cells is usually shown by healthy nonimmune dogs soon after exposure to the virus of Carré?
1. A shower of stab cells.
2. A mononucleosis.
3. An eosinophilia.
4. Rapid increase in erythrocytes.
5. Leukopenia.

5. Hemolytic icterus was observed in apparently normal foals after they had obtained antibodies that destroyed their red cells from the dam's milk. The proper method of preventing this problem is to:
1. Give a large dose of aloin and calomel to overcome the jaundice and then allow the foal to live on cow's milk.
2. Inject the mare before the foal is born with blood from the sire of the foal.
3. Give the icteric foal a dose of its dam's blood subcutaneously.
4. Not breed such mares to high class stallions.
5. Remove the foal from the mare immediately after it is born and provide a suitable nurse mare.

6. Lymphocytoma in the bovine is always characterized by:
1. An increase in the size of the liver.
2. Overgrowth of lymphoid cells in lymphatic structures.
3. An increase in the size of the spleen.
4. Symptoms of a digestive disturbance.
5. Leukocytosis, chiefly a lymphocytosis.

7. Luxation of the patella can be corrected by:
1. Removing the fabellae.
2. Dividing the fascia on the medial side of the patella.
3. Dividing the lateral patellar ligament.
4. Dividing the fascia on the lateral side of the patella.
5. Dividing the medial patellar ligament.

8. Bovine postparturient hemoglobinuria occurs chiefly after the third calving at 5 to 8 years of age. This condition responds most readily to:
1. Fractional penicillin therapy to total 1,000,000 to 1,500,000 units accompanied by sulfanilamide *per os*.
2. Flushing the uterus with a suitable antiseptic solution, following removal of afterbirth and intravenous injection of gelatin solution.
3. Blood transfusions with a diet of alfalfa hay alone, accompanied by stimulant and alternative powders.
4. Gelatin transfusions and a diet of high-protein cereals and diuretic powders.
5. Intravenous administration of 5 per cent dextrose in physiological saline and sodium sulfapyridine.

9. Control of the primary screwworm fly *Cochliomyia americana* is possible because:
1. Burying of dead carcasses will prevent the screwworm from using them as breeding places.
2. Ordinary repellants and barn sprays will kill them.
3. Proper disposal of manure will destroy the breeding places of the flies.
4. The screwworm is a parasite of living tissue; successful control is achieved by prevention of infestation through proper treatment of wounds in stock.
5. Destruction of infested hosts provides a practical control device.

10. A mottled appearance of the liver of pigs because of centrolobular necrosis and congestion in the affected areas probably results from:
1. Having been sprayed with an oily solution of DDT.
2. Drinking milk products which have been allowed to sour in a galvanized metal container.
3. Eating plants of the genus Ranunculus.
4. Eating fragments of expended clay pigeons or targets.
5. Eating bran mixed with arsenic for grasshopper bait.

11. There is a pale area in the kidney, depressed at the surface, and cone-shaped with the base of the cone at the capsule. The area has undergone necrosis as seen on microscopic examination. The blood vessels at the margin are congested and there is much proliferation of fibroblasts and infiltration of leukocytes. These are both lymphocytic and polymorphonuclear in type. Other parts of the kidney are not changed. Which of the following conditions is being described?
1. Infarct.
2. Abscess.
3. Indurative nephritis.

4. Parenchymatous nephritis.
5. Cystic kidney.

12. Which of the following tuberculous conditions in a meat animal might *not* necessitate condemnation of the entire carcass?
    1. Animal with only a few lesions but which showed fever of 104 F. before slaughter.
    2. Extensive lesions in only one body cavity.
    3. Lesions in lungs, spleen and kidneys.
    4. Localized lesion in lungs also affecting adjacent pleura.
    5. Animal with only a few lesions but showing cachexia.

13. Amputation of the forelimb is *always* indicated when there is:
    1. Injury to the radial nerve.
    2. A recurrent luxation of the scapulohumeral joint.
    3. A compound fracture of the humerus.
    4. Trauma to the lower limb and foot.
    5. Permanent paralysis of the brachial plexus.

14. Urinary calculi occur in both horses and cattle. When these calculi cause an obstruction to the passage of urine, surgical intervention is the only satisfactory means of relieving the obstruction. When this operation is performed on the male or neuter *equine*, what differing considerations must be kept in mind as compared to those encountered when performing the operation on a male or neuter *bovine?* In the equine:
    1. The calculi are multiple and small enough to be voided in the urine so that the urethrotomy alone is sufficient.
    2. Surgical intervention is very difficult due to the fact that the urethra is located deep in the tissues along its course, making it difficult to locate and prone to hemorrhage.
    3. The calculi tend to lodge along the course of the urethra, making it necessary to perform a urethrotomy and then passing a catheter downward along the course of the urethra until the calculus is reached when it can then be removed.
    4. The calculus is usually single and most often lodges in the neck of the bladder so that the calculus must be removed from the bladder in addition to performing a urethrotomy.
    5. The calculi are usually soft in structure and can be easily broken up and flushed out of the bladder.

15. The variable reactions of different animal species in anaphylactic shock depend upon the:
    1. Number of blood groups common to the species.
    2. Species variation in the localization of precipitin.
    3. Ratio of blood volume to weight of viscera.
    4. Relative distribution of smooth muscle.
    5. Ability of the species to produce antibody rapidly.

In table 1, the first of the two right-hand columns shows the number of items (questions) allotted to each of the subject matter headings and the second column shows the numbers assigned to the various questions in each of the three parts of the examination.

TABLE 1—Detailed Outline of Veterinary Medical Examination (Revised)

	No. of items	Item No. in exam.
PART A		
I Anatomy		
a. Gross		
1. Skeleton	4	1- 4
2. Muscles	4	5- 8
3. Nervous system	5	9- 13
4. Circulatory system	7	14- 20
5. Viscera	4	21- 24
6. Topographical anatomy	6	25- 30
b. Histology	10	31- 40
c. Embryology	5	41- 45
II Physiological Chemistry		
a. General metabolism	5	46- 50
b. Blood	5	51- 55
c. Urine	5	56- 60
III Physiology		
a. Alimentary tract	12	61- 72
b. Circulatory system	11	73- 83
c. Respiratory system	8	84- 91
d. Excretory system	8	92- 99
e. Neuromuscular system	8	100-107
f. Reproductive system	8	108-115
g. Endocrine glands	5	116-120
IV Pathology		
a. General	10	121-130
b. Special		
1. Alimentary tract	6	131-136
2. Circulatory system	5	137-141
3. Endocrine glands	5	142-146
4. Genitourinary system	4	147-150
5. Pancreas, liver, spleen	7	151-157
6. Neuromuscular system	4	158-161
7. Respiratory system	5	162-166
8. Skin	4	167-170
c. Clinical	10	171-180
PART B		
I Bacteriology		
a. Bacteria	18	1- 18
b. Fungi	4	19- 22
c. Rickettsiae	2	23- 24
d. Spirochetes	3	25- 27
e. Viruses	10	28- 37
f. Serology and immunology	8	38- 45
II Hygiene		
a. Infectious disease control	15	46- 60
b. Meat inspection	10	61- 70
c. Milk inspection	5	71- 75
III Parasitology		
a. Internal parasites	10	76- 85
b. External parasites	5	86- 90
IV Pharmacology and Therapeutics		
a. Allergy	1	91
b. Anesthetics	2	92- 93
c. Circulatory system	2	94- 95
d. Endocrine glands	2	96- 97
e. Alimentary tract	4	98-101
f. General	3	102-104
g. Hematopoietic system	2	105-106
h. Infectious and parasitic diseases	4	107-110
i. Neuromuscular system	2	111-112

(Continued on next page)

TABLE 1(Continued)—Detailed Outline of Veterinary Medical Examination (Revised)

	No. of items	Item No. in exam.
j. Parenteral fluids	2	113-114
k. Respiratory system	2	115-116
l. Minerals and vitamins	2	117-118
m. Toxicology	2	119-120
PART C		
I Physical Diagnosis	15	1- 15
II Medicine		
a. Dermatoses	4	16- 19
b. Differential diagnosis	8	20- 27
c. Circulatory system	6	28- 33
d. Endocrine glands	4	34- 37
e. Alimentary tract	6	38- 43
f. Diseases of the blood	3	44- 46
g. Infectious and parasitic diseases	13	47- 59
h. Metabolic diseases	5	60- 64
i. Neuromuscular system	3	65- 67
j. Respiratory system	8	68- 75
III Surgery		
a. General	12	76- 87
b. Head and neck	6	88- 93
c. Thorax	2	94- 95
d. Abdomen	10	96-105
e. Limbs	10	106-115
f. Genitourinary system	10	116-125
g. Tumors	5	126-130
h. Radiology	5	131-135

The numbers of the correct answers to the 15 sample items are shown in table 2.

DISCUSSION

There is a reason for the title of this paper. Where objective testing is going, as a method of helping to evaluate the professional competency of candidates for veterinary licensure, will be largely determined, we believe, by developments of the next two or three years. The National Board-P.E.S. tests that have been used for the past three years by several state boards were prepared to serve the best interests of the profession and those seeking to enter it. It is well to recall some of the objectives of the National Board idea when it was first sponsored by the AVMA back in 1943, as stated in the Board's constitution adopted in 1950:

> The objectives . . . shall be to advance the science of veterinary medicine; to elevate the standard of qualification for the practice of veterinary medicine. . . .

Ultimately, the National Board idea will succeed or fail depending on recognition by the profession, and those seeking to enter it, of the potential value of objective testing in veterinary medical licensure and the need to safeguard its integrity.

Apart from the discredit to the profession through failure to observe high standards in *all* phases of the licensing process, efforts to crack the objective test (or any other written test) are short-sighted ventures even if carried on by only a minority of candidates who have a "sporting" attitude toward testing programs of any kind.

As so well stated by Dr. Dean F. Smiley at the conference in his talk, "The Need for More Cooperation":

> Teaching in the health professions is a continuously changing procedure. . . . It is essential that members of state boards of examiners keep themselves constantly in touch with current teaching programs . . . in order that their examinations may be adjusted to the changing and ever-improving pattern of instruction.
>
> Tremendous advancement has also taken place in methods of evaluating competence in the health professions. It is essential that teachers. . . . keep themselves informed regarding changes, advances, and experiments in methods of evaluating professional competence in order that they may effectively prepare their students to give a good account of themselves in such examinations.

We are confident that National Board examinations, as developed jointly with Professional Examination Service, can contribute much to the advancement of veterinary licensure in this country if those administering and those taking the tests will recognize the significance of the examination's integrity and so help to make the whole program successful.

TABLE 2—Sample Items to Show the Nature of the Objective Test in Veterinary Medicine

No.	Classification	Answer
1.	Anatomy—gross	3
2.	Biochemistry—urine	4
3.	Physiology—circulatory system	1
4.	Medicine—diseases of the blood	5
5.	Medicine—diseases of the blood	5
6.	Medicine—tumors	2
7.	Surgery—limbs	2
8.	Therapeutics—hematopoietic system	3
9.	Parasitology—external parasites	4
10.	Pathology—pancreas, liver, spleen	4
11.	Pathology—genitourinary system	1
12.	Hygiene—meat inspection	4
13.	Surgery—limbs	5
14.	Surgery—genitourinary system	4
15.	Bacteriology—immunology	4

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The Veterinarian in Time of Disaster

RAYMOND B. CHURCH, V.M.D.

Winsted, Connecticut

THIS IS A REPORT of the experiences of a general practitioner who served in the flood disaster of Aug. 18-19, 1955, in the northeastern states. It is hoped that it may remind members of the veterinary profession of the value of their training and suggest to them some of the multitude of tasks for which veterinarians are singularly prepared to render rare service when disaster strikes a community; it is also hoped that it may dramatize the need for cooperation in civil defense groups to serve in times of any disaster.

Winsted, Conn., is a typical New England factory town of some 11,000 inhabitants. It is situated among hills and surrounded by agricultural areas. The main street is closely parallel to a small river, the Mad River, with most of the town's business establishments on both sides of this street. Many of the stores and shops have apartments above them. On one side of the street, most buildings project over the bank of the river. During the heavy rainfall of that week, the river began to rise and during the night of August 18 it reached flood heights.

My small animal hospital is situated on a hill near my home in the east part of town. The night of August 18, I had made a midnight call and, on returning, had checked some property on the other side of town at about 1:00 a.m. Seeing that the river was rising, I telephoned a warning to a few homes in the area where there were no lights, before I returned home.

In the morning, I discovered that electricity, gas, water, and telephone service had ceased. A trip to town ended a block from my home, where hundreds of residents were gathered to watch the surging waters which had flooded most of the business district and many residential areas. The east end of Winsted was isolated from the rest of the town by water which moved so swiftly that boats could not cross it. There were rumors of loss of life, also that "Main Street is wiped out."

THE EMERGENCY PHASE

The "emergency" phase of the disaster had begun and I soon learned how a veterinarian can best use his technical training at such a time.

I returned home to find a messenger from the state police requesting drugs—"penicillin, tetanus, anything you have." The police were informed that considerable quantities of antibiotics were available at the veterinary hospital and, shortly thereafter, I was requested to report to the police. I was informed that no medically trained man, other than myself and a neighboring veterinarian, was available in the east end of town. Therefore, I was requested to examine a man suffering from a heart condition.

Investigation showed an aged couple who had been marooned in a second-floor apartment in water up to their chins for eight hours. The man had a chronic cardiac ailment and was dyspneic and cyanotic. After reassuring and comforting the man, he was transferred to a convalescent home in the next town where arrangements were made for his medical care.

In the meantime, my hospital was available for emergency and first-aid treatment until the following day when the water receded and disaster headquarters, including offices of local government, civilian defense, health officers, and the Red Cross, had been set up in a school building.

I offered my services to the local health officer, one of the two physicians available, who welcomed my assistance. With the physicians, I helped provide medical supplies—cotton, gauze, sponges, syringes and needles, cold sterilizers, and other items pending the arrival of supplies from the Red Cross by helicopter. Then, until adequate medical personnel arrived, and at the request of the health officer, a physician, I helped administer typhoid vaccine.

APPRAISAL OF DAMAGE PHASE

The following day, it was necessary to make an appraisal of damage. The entire Main Street was gutted and stores and shops were ruined. All utilities had been disrupted. Water is normally supplied to the town from a reservoir on the south side but the water mains were broken so most

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of the residential areas were without water. A new sewage system and disposal plant had just been installed in Winsted, with the large main pipe laid the length of Main Street. Old sewer lines draining sewage from residences on the hills on each side of the river had, in many cases, not yet been tied into this new sewer. Both old and new sewers were damaged and sewage was collecting in many places in Main Street.

Half of this day was spent with water and street department heads, ascertaining the extent of the damage, in order to learn what health hazards existed and to acquaint them with the most urgent problems from a health standpoint. The rest of the day was spent, with a military escort, examining the conditions of restaurants, taverns, and other eating establishments and food stores along Main Street.

THE REMEDIAL PHASE

Veterinary training again proved helpful when the "remedial phase" started. Veterinarians aided personnel of the state health department and the Federal Food and Drug Administration in closing all food-serving establishments which had been flooded and ordering destroyed all products which had been under water and which were presumed to be contaminated. They then instructed personnel in cleaning and disinfecting.

All coolers and freezers were inspected and foods found unfit for consumption were condemned and ordered held for destruction, as were all frozen foods which had been defrosted. These condemned products were loaded under supervision of a veterinarian and taken under guard to a designated area where they were buried. Meats, vegetables, and other fresh foods were given particular attention in disposal because of the fly problem and odors resulting from decomposition. One veterinarian,* the local sanitary inspector, spent many days working with crews on this problem alone, and his services were invaluable.

I inspected all establishments serving food, including the two canteens set up for emergency feeding of Army and civilian personnel, to assure a safe supply of milk and meat products. In some cases, it was found that raw milk had been delivered; 500 qt. of milk had been delivered to one canteen, direct from a farm. This was removed to a nearby pasteurizing plant which had been cut off from its normal supply of raw milk.

All eating establishments, including the canteens and restaurants serving imported crews for utility companies, were examined for proper dish-washing facilities. I supplied quaternary ammonium compounds from my hospital for disinfection of dishes washed in scant supply of water.

Fly control measures were instituted. Since garbage disposal had become a problem, due to the preoccupation of vehicles normally used for this purpose, I moved my disposal unit to disaster headquarters to aid in this matter.

Next to food sanitation, probably the most important sanitary hazard was the sewage disposal problem. In addition to difficulty due to ruptured mains of sewage lines, public water was not available for use in flushing toilets where lines were intact, for several days, except when carried from other sources in buckets. Therefore, all public toilet facilities were immediately closed and trench latrines were erected in the vicinity of the disaster headquarters.

Areas of raw sewage collection were identified and treated with chlorinated lime. These areas were called to the attention of the sewer commission and marked for priority in repair. Those areas which drained into this were noted and veterinarians, working with crews supplied by the civilian defense office, erected latrines for critical areas to minimize the amount of sewage discharging through broken lines.

Water supply was a major problem. Natural water supply sources, such as roadside springs, were sought out, inspected, and improved where possible. Veterinarians aided state and local health workers by posting warnings to boil all water, including public water (when available) before use. When public water lines were restored, state health department inspectors made frequent checks of the chlorine content. It was nearly two weeks before this water was safe for use.

Veterinarians were called upon for other advice as to water sanitation, such as the methods of disinfection of dug wells.

Stray animals presented a problem, particularly since the local dog pound had been damaged. Consequently, veterinary hospitals were made available for housing stray dogs and cats. It might be added that in

*James R. Williamson, Winsted, Conn.

times such as these, dog wardens and others may bring on public resentment through overzealous attempts to pick up lost animals and destroy them at once. Such was the case at this time and I interceded with the health officer when a public announcement had been made that all stray animals would be shot on sight. This order was resented as, in many cases, owners had been too occupied in caring for the destitute and aiding reconstruction to properly confine their pets.

CONCLUSION

In time of disaster, a veterinarian's training qualifies him for rendering emergency medical care and for carrying out sanitary measures in cooperation with the local health officer, the Red Cross, civil defense, and local government agencies, who welcome his services. It is important that all veterinarians not only be acquainted with the emergency organizations of their communities but also be included in them in order to permit the best use of their technical training. No extensive training is necessary but a standard method of operation set up in advance would avoid endless delay and duplication of activities.

Hog Cholera in Georgia.—Of 8 cases of hog cholera seen at the Tifton Diagnostic Laboratory, only 1 was in unvaccinated pigs. Six were in herds that had been vaccinated without serum. Cholera is rarely seen in Georgia since virulent virus was banned.—*Georgia Vet., Dec., 1955.*

Trichinosis in Animals in Iowa

Studies over 20-month periods, nine years apart, in Iowa, indicated that the incidence of Trichina in bulk pork sausage dropped from 12.4 per cent in 1946 to 1.2 per cent in 1955. Prohibiting the feeding of raw garbage may have been an important factor.

The incidence of trichinosis in animals examined during 1953 to 1955 was: swine, 0.046 per cent; rats and adult foxes, about 11.8 per cent; mink, 14.1 per cent; and of 4 coyotes, 50 per cent.

Transmission of trichinosis to swine may be direct, by eating infected carcasses, or indirect, by ingesting fecal material of roving carnivores.—*Am. J. Pub. Health, March, 1956.*

Equine Encephalomyelitis in 1955

Infectious equine encephalomyelitis was more widespread in the United States in 1955 than in 1954 but the total number of cases remained about the same; about 1,000 each year. The nation-wide fatalities in affected animals were about 33 per cent in 1954 due to the prevalence of the eastern-type virus in the southeastern states. In North Carolina, Georgia, South Carolina, Alabama, and Mississippi, where no cases were reported in 1954, fatalities in 1955 were about 80 per cent. In Louisiana, Florida, Wyoming, Colorado, and New Mexico, an increased number of cases was reported. A number of cases was also reported in Massachusetts and Rhode Island where none was reported in 1954.—*U.S.D.A., March 21, 1956.*

Nitrite Poisoning from Meat

Methemoglobinemia occurred in ten children in Louisiana and was believed associated with the ingestion of processed meats containing nitrites in excess of the legal maximum (200 p.p.m.).

The children had sickened one and one-half to two hours after eating wieners or bologna manufactured by one company. Their lips and fingers, especially around the nails, became bluish. Those treated with methylene blue recovered almost immediately and those untreated felt better after vomiting. All were well the following day.

Two cats died an hour after eating bologna but a dog, which ate a small amount, recovered.

Analysis showed that the nitrite content of the meats varied from negligible to 45 times the maximum legal amount, indicating a grave deficiency in the method of applying the nitrite.—*U.S. Pub. Health Serv., March 15, 1956.*

Human Brucellosis in North Carolina

A meat inspector in North Carolina, a state with an outstanding record on bovine brucellosis eradication, recently developed brucellosis. He was an inspector of pork which came from all parts of the United States. Only five cases of brucellosis in man had been reported in the state in the previous two years.—*U.S. Pub. Health Serv., March 22, 1956.*

Surgery and Obstetrics
and Problems of Breeding

Ectopic Sesamoid Bones at the Elbow (Patella Cubiti) of the Dog

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NOT THE LEAST complicated joint structure of the dog is the elbow joint, and lamenesses due to traumatic and pathological causes are a frequent concern of the small animal practitioner. I have recently treated 3 dogs which were lame due to inflammation caused by ectopic sesamoid bones at the elbow joint (patella cubiti). This is an infrequent condition involving the presence of one or more atypical sesamoid bones incorporated within the elbow joint or on the extensor surface of the joint. The condition is significant not only because it is an anatomical rarity, but rather because in all 3 cases the presence of these sesamoids was the direct cause of severe and persistent lameness of the limb involved.

REVIEW OF LITERATURE

Mention of patella cubiti in medical textbooks is not common. John Caffey[1] makes the brief observation, "Rarely, a sesamoid bone develops in the triceps tendon (patella cubiti)."

Sante[2] suggests that the condition arises from injury early in life to the epiphysis of the olecranon or as an inherent developmental defect. The net result is a divided epiphysis which forms a separate structure much like the patella.

Waters and Kaplan[3] reviewed the work of J. E. Habbe in which he reports on 4 cases in man. In 3 of these, there was also a history of childhood injury to the elbow. In the other case, extensive roentgen study of the entire skeleton showed minor developmental disturbances affecting the epiphysis of certain of the vertebra also. He believed there was doubt as to trauma being the only etiological factor in all cases.

As far as I can determine, the condition has never been reported in the dog.

CASE HISTORIES

Case 1.—In June, 1954, a 6-month-old, male German Shepherd was examined because of increasing lameness in the right foreleg and a continual swelling in the region of the elbow. The pup was large for his age and "well-boned." He preferred not to bear any weight on the limb. His temperature was 102.4 F. and there was a soft-tissue swelling over all the elbow area.

A tentative diagnosis of coccidioidomycosis involving the bone was made (a condition not uncommon in dogs in this area). However, a radiograph (fig. 1) disclosed the presence of a bonelike structure in close proximity to the humeral shaft. The opposite (left) elbow, when radiographed, appeared to be normal.

The dog was then anesthetized and the boney structure could be palpated in the depression between the triceps tendon and the shaft of the humerus. With the muscle tension relaxed, a snapping of the triceps tendon could be detected when the elbow joint was flexed. We speculated that this "bow-string" action upon the extended tendon could have been responsible for most of the resulting inflammation.

This saddle-shaped boney structure was removed by making a curved incision over the lateral aspect of the elbow and dissecting down to its location with the scalpel. Its only attachments were to the triceps tendon, and these were severed. The surface adjacent to the humeral shaft was glistening, smooth and not unlike a normal articular surface. Deep tissues were drawn together with chromic catgut sutures and the skin was closed with interrupted sutures of 38-gauge, stainless steel wire. The area was covered with a stockinet bandage and wrapped snugly with tape. The dog made a satisfactory recovery.

Radiographs taken 18 months later, to ascertain the condition of both elbows, revealed a second sesamoid within the left elbow joint (fig. 2). It seemed to extend along the dorsal border of the olecranon and partially filled the olecranon fossa.

Although the dog had not been lame since the original surgery, the owner said that both elbows "cracked" when the dog was in motion. Crepitation of the tendons over the lateral aspects of the joints was obvious on palpation.

Case 2.—A 5-year-old German Shepherd bitch, which had enjoyed a successful ring career and had completed her champion-

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The author expresses his appreciation to R. V. Karlen, M.D., radiologist, and Frank J. B. Sweeney, R.T., for their assistance in diagnosis; and to R. M. Cello, D.V.M., of the University of California, at Davis, for his aid in providing the key to additional references.

Fig. 1—Radiograph of right elbow region of a 6-month-old German Shepherd (case 1) showing the presence of a bony structure (patella cubitus) in close proximity to the distal humeral shaft (arrow).

Fig. 2—Radiograph (same dog as fig. 1), at the age of 24 months, of the left elbow region showing the presence of bony structure (patella cubitus) in the fossa above the olecranon (arrow). This was not present when the one on the right side was removed 18 months earlier.

Fig. 3—Radiograph of elbow region of a 5-year-old bitch (case 2), mother of dog in case 1. Notice the two sesamoid bones. The line between them and the olecranon (a) and the line showing on the condyle of the humerus (b) were interpreted as fractures.

Fig. 4—Radiograph, with same elbow as figure 3 in greater flexion, showing that the "fracture line" on the condyle (arrow) had moved. This indicates the presence of sesamoids instead of a fracture.

ship, had to be retired due to recurrent lameness of the left foreleg. She bore weight on the leg but limped noticeably. Examination on Oct. 13, 1955, disclosed excessive crepitation when the elbow was flexed or extended. It was believed that she had developed an arthritis and a course of cortisone therapy was instigated.

Three weeks later, the owner reported that a physician had radiographed the elbow (fig. 3) and had made a diagnosis of fractures involving the olecranon and

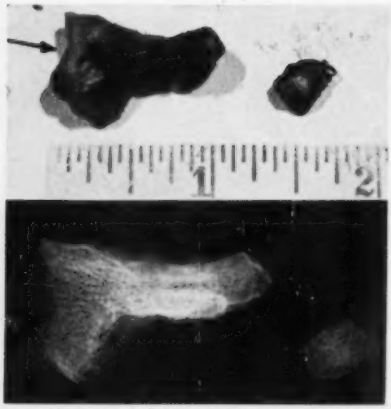

Fig. 5— Photograph (top) of the sesamoids from dog in case 2 following their removal. Notice the articular surface (arrow) on the larger bone.

Fig. 6—Radiograph (bottom) of the two sesamoid bones following removal. Notice the trabeculae.

distal humerus. The leg had been placed in a cast, which had recently been removed, but the dog was still quite lame.

It was then learned that this animal was the mother of the other dog (case 1). Additional radiographs of the elbow at various degrees of flexion were taken. It was evident that the hard tissues had no normal identity with the olecranon and could not be the result of a fracture; also, the "fracture-line" on the condyle of the humerus moved distally when the elbow was radiographed in a position of greater flexion (fig. 4). This "fracture line" appeared to be the dorsal border of the olecranon within the olecranon fossa of the humerus.

During surgical removal, when the larger of the two sesamoids was grasped with a forceps and twisted from its attachment to the olecranon, a completely unsuspected, footlike extension appeared which almost completely filled the olecranon fossa of the humerus (fig. 5). All surfaces of this extension were glistening and smooth from articulating with the humerus in the fossa. The degree of fibrous union between the sesamoids and the olecranon made the relation of the two structures that of an extension of the olecranon protruding into the fossa.

Case 3.—On Jan. 13, 1956, an 18-month-old, male German Shepherd was reported to have a "sore right foot." Examination revealed no sensitiveness at any point, but he resented any pressure or movement of the elbow. No soft tissue swelling was evident.

The history disclosed that the bitch (case 2) was also the mother of this dog, although he was from a different litter than the first dog (case 1). At about 6 months of age this dog had been struck by a car, and a fracture of his left femur had been repaired by pinning.

Radiographs of the right elbow showed an ectopic sesamoid (fig. 7) similar in size and location to the larger of the two sesamoids removed from his mother. This one has not been surgically removed.

Fig. 7—Radiograph of elbow region of dog (case 3) at 18 months of age. Note similarity of size and location of sesamoid (arrow) to the larger of the sesamoids shown in figures 3 and 4.

DISCUSSION

That these sesamoids were true bone was demonstrated by radiographs, following their removal, showing typical trabeculae (fig. 6) within their substance. This eliminated the possibility of concretion or other anomalies and substantiated the presence of what is termed patella cubiti in man.

Of great interest is the close genetic relationship of the 3 animals. There had been no history of previous injury to the affected limbs and the bitch had always performed satisfactorily as a show animal.

Each dog had been well cared for, including nutrition and housing.

In reviewing case 1, it would seem that osteogenesis was slower in the sesamoid of the left elbow. By 24 months of age, ossification of this bone was complete and was clearly evident radiographically (fig. 2), whereas at 6 months of age it showed no significant development. Because of the many coincidental relationships in the 3 dogs, one can not resist speculating that this condition was hereditary.

SUMMARY

Three cases of ectopic sesamoids (patella cubiti) in dogs are described.

In 2, surgical intervention and the removal of the sesamoids restored normal function of the leg.

References

[1]Caffey, John: Pediatric X-Ray Diagnosis. Yearbook Publishers, Inc., Chicago, Ill. (1945): 578-579.

[2]Sante, L. R.: Principles of Roentgenological Interpretation. 8 rev. ed. Edwards Bros. Inc., Ann Arbor, Mich. (1945): 52, 152.

[3]Waters, Charles A., and Kaplan, Ira I.: Yearbook of Radiology (reprinted from Habbe, J. E.). Am. J. Roentgenol. (Oct., 1942): 513-526.

Artificial Insemination of Swine in Britian

Little has been reported about artificial insemination in swine in the past two decades. In Britain, it now seems practical because many farmers keep only a few sows and, to improve the type, wish to breed them to special boars.

Semen is easily collected by allowing the boar to mount a dummy and using an artificial vagina about 30 cm. long. Semen could also be collected by electrical stimulation. The volume ejaculated may be from 100 to 500 ml.—usually about 200 ml. While the concentration of sperm is low, the total number in a single ejaculation is 5 to 10 times as many as from a bull. The time required for ejaculation is three to 20 minutes, with alternate active and quiet periods on the part of the boar.

The semen is divisible, by its characteristics, into three fractions. The first, called the "presperm" fraction, accompanies the initial activity and contains no sperm, the second, or "sperm-rich," fraction has a high concentration of sperm; and the third, or "postsperm," fraction is clearer in appearance and contains a low concentration of sperm. This ejaculation cycle may be followed by a second and even a third cycle at one breeding. Normally, ejaculation is directly into and fills the uterus, with the gelatinous content of the semen forming a plug at the cervix after the service.

For insemination purposes, either the whole semen or only the sperm-rich fraction, which can be collected separately, are used. The semen is filtered through fine gauze to remove gelatinous material. After allowing it to cool to 25 C., it is diluted with an egg yolk-glycerin medium to varying dilutions, usually 1:9. If not used within two hours following dilution, it is cooled and kept at 5 C.

For inseminating, a rubber catheter 45 cm. long and 1 cm. in diameter is used. It is connected to an infusion apparatus with a bottle which holds 100 ml. of semen. The semen is warmed to at least 20 C., so that it will not be expelled, and is slowly injected directly into the uterus. About 50 to 60 per cent of sows become pregnant if inseminated on the second day of heat. When bred later, both the percentage of pregnancies and the size of the litter are reduced.—*C. Polge, Vet. Rec., Jan. 28, 1956.*

Vaginal and Uterine Prolapse in Cows

In a 20-year period, 93 cases of vaginal and uterine prolapse occurred in 7,859 births in a range Hereford herd in Montana, with a top incidence of 2.7 per cent in one year. The age of the cows made no significant difference, but there was a tendency for a more frequent occurrence at the first calving and in cows more than 7 years of age.

This condition is most serious in Herefords but it could be somewhat controlled by rigorous culling, suggesting a hereditary susceptibility.—*J. Anim. Sci., Feb., 1956.*

The artificial insemination of chinchillas, using electric stimulators to obtain semen, is encouraged in an article in the *National Chinchilla Breeder* (Feb., 1956).

Estrus was suppressed in rats by daily subcutaneous doses (50 μg.) of reserpine, an alkaloid from *Rauwolfia serpentina.*—*Vet. Bull., March, 1956.*

Clinical Data

Acute Klebsiella (Capsulated Coliform) Mastitis

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LUCET[1] was probably the first to report the presence of coliform organisms in the milk of cows affected with mastitis. Coliform mastitis has also been reported by Murphy and Hanson,[2] Lipman,[3] Schalm,[4] Plastridge,[5] and Easterbrooks and Plastridge.[6]

Klebsiella mastitis, as such, has been reported by Laigret and Leblois,[7] Buntain and Field,[8] Barnes,[9] and Easterbrooks and Plastridge.[6]

The purpose of this report is to present data which were accumulated over the past ten years, to summarize the present knowledge, to report field case histories and experimental infection trials, and to show that acute coliform and Klebsiella mastitis are one entity.

DESCRIPTION OF THE ORGANISM

In our experience, the organism and its growth on agar are best described by a direct quotation from "Bergey's Manual" relative to *Aerobacter aerogenes*: "Rods: 0.5 to 0.8 by 1.0 to 2.0 microns occurring singly. Frequently capsulated [fig. 1]. Usually non-motile. Gram-negative. . . . Agar colonies: Thick, white, raised, moist, smooth, entire." Even though this is so, "Bergey's Manual" also states: "Capsulated types of coliform bacteria are still placed in this edition of the *Manual* in a separate genus, *Klebsiella*. . . ."

Kauffmann[10] in an excellently prepared monograph summarized the situation and confusion surrounding the classification of the colon organisms as follows:

> If in keeping with Bergey's Manual we want to divide the tribe Escherichieae into genera, only two genera, 'Escherichia' and 'Klebsiella,' should be set up, not three: 'Escherichia,' 'Aerobacter,' and 'Klebsiella'. The establishment of genera being based on biochemical methods, it is necessary to enter Aerobacter and Klebsiella types into one common group. Owing to the rules of nomenclature, it is not permissible to designate this group as 'Aerobacter' because the term 'Klebsiella' has priority—the *Klebsiella group* is made up of non-motile, Gram-negative, non-sporing rods that do not form indole—frequently give a positive Voges-Proskauer reaction and a negative methyl-red reaction. As a rule these bacteria grow in Simmon's sodium-citrate agar; normally they possess a capsule, and most of them form mucus.

Of 69 cases of udder infection by coliform bacteria reported by Murphy and Hanson,[2] 41 were classified as *A. aerogenes*, 18 as "intermediate" types, and only 10 as *Escherichia coli*. In essence, 59 of 69 would probably have been classified as Klebsiella using Kauffmann's[10] scheme.

Although the fact had been known to us for at least six years previously, Plastridge[5] was the first in the United States to report the association of a capsulated coliform organism with acute systemic mastitis. At that time, we were not aware of the apparently preferred classification of Klebsiella over Aerobacter for this organism.

FIELD CASE HISTORIES

During the period covered by this report, many cases of acute Klebsiella (capsulated coliform) mastitis were diagnosed and confirmed by laboratory tests. Although the great majority of the isolations satisfied the criteria used to identify *A. aerogenes* at the time, occasionally a capsulated coliform indistinguishable from *Esch. coli* was isolated. The disease occurred in animals of all ages, at all stages of lactation, and in all breeds. Contrary to what might be expected, it occurred most frequently under excellent conditions of sanitation and management.

In general, the onset of acute Klebsiella mastitis is sudden. The affected cow may appear normal at one milking and be very sick by the following milking. Typical

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This paper was presented at the Northeastern Mastitis Council, Guelph, Ont. (Oct., 1955); the Pennsylvania (Philadelphia, Jan., 1956), North Dakota (Fargo, Jan., 1956), and Colorado (Fort Collins, Feb., 1956) veterinary conferences; and the annual meeting of the Kansas State Veterinary Medical Association (Hutchinson, Feb., 1956). It will also be published in the proceedings of the meeting of the Kansas Veterinary Medical Association.

The authors express their sincere appreciation to the many persons whose assistance made the presentation of this paper possible, among whom are: Mr. H. H. Hale who isolated and maintained strains C-5 and MC; Dr. P. R. Edwards who did the serological typing which positively classified the strains as Klebsiella; Mr. E. A. Gianforte who conducted the mouse toxicity tests; Mr. A. C. Dornbush who provided the antibiotic-sensitivity data; Dr. R. J. Price for care of the experimental animals and assistance in collecting data; and Mrs. D. Budd for editing the manuscript.

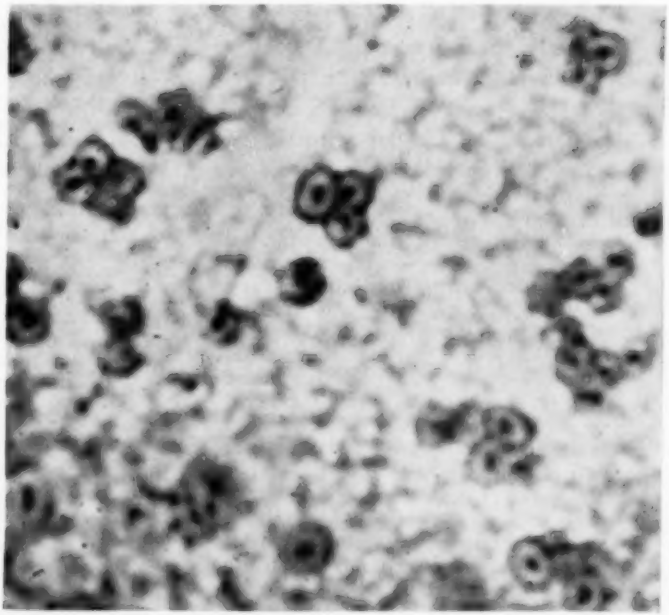

Fig. 1—Klebsiella (capsulated coliform) organisms. x 1,200.

symptoms include weakness, a rapid drop almost to cessation of milk production (the secretion may contain soft, white clots or may be serum-like in appearance), loss of appetite, dullness and depression, a temperature of 104.0 to 108.0 F., and one or more hard, swollen quarters. If the disease process is not reversed quickly, the affected animal loses weight rapidly, and may develop swollen and painful joints especially in the hindlegs.

The cases which follow were selected as typical of acute Klebsiella mastitis and indicate the efficacy of some therapeutic agents. Routine therapy consisted of 250 ml. of 25 per cent sodium sulfamethazine* solution administered intravenously, followed by three, 15-Gm. oblong sulfamethazine tablets given twice the second day; two, 15-Gm. tablets given twice the third day; and one, 15-Gm. tablet given twice the fourth day. This routine therapy for acute mastitis, used in a number of herds in Connecticut, has been effective in more than 75 per cent of the cases without the aid of other systemic therapy. Antibiotic udder infusions were administered as soon as the quarter was soft enough to receive treatment, which was usually within 12 to 24 hours. Various other treatments used will be described in the separate case reports.

Before modern therapy was available, a high percentage of animals with symptoms similar to those described died. At the present time, most animals receiving treatment within 12 hours after onset recover. The involved quarter may be lost; however, many cows receiving prompt treatment are returned to the milking line within seven days.

Field Case 1.—In this cow, one quarter was involved; her temperature was 107.0 F.; other symptoms were typical. The septicemia in this animal responded rapidly to a single, 250-ml. dose of a 25 per cent solution of sodium sulfamethazine administered intravenously. One tube of mastitis ointment containing 426 mg. of chlortetracycline† was infused. Confinement to a box stall and hot water applications to the udder were the only supportive therapy. This was considered a mild case—at least, the animal returned to production in four days.

Field Case 2.—This was a typical case with one quarter involved. The cow's temperature was 106.4 F. She was in late lactation and, although it was considered

*Sulmet, ® American Cyanamid Co., Lederle Laboratories Division, Pearl River, N.Y.

†Aureomycin® mastitis ointment, American Cyanamid Co., Lederle Laboratories Division, Pearl River, N.Y.

desirable to dry her off shortly after the attack, she responded to routine sulfamethazine therapy and one udder infusion of chlortetracycline ointment. On the following lactation, this cow returned to normal production.

Field Case 3.—One quarter was involved in this cow; her temperature was 103.4 F. and other symptoms were typical. Sulfamerazine, 500 ml. of a 12.5 per cent solution, was administered without benefit. In six hours, when the temperature had risen to 105.4 F., routine sulfamethazine therapy was employed. The quarter was infused with 200,000 units of penicillin and 200 mg. of streptomycin. The cow made a satisfactory recovery and was producing about 75 per cent of her expected lactation in seven days.

Field Case 4.—One quarter was involved; the cow's temperature was 105.4 F.; other symptoms were typical. Routine sulfamethazine therapy was followed by only a temporary improvement. Starting the third day, 5 Gm. of dihydrostreptomycin sulfate was administered, intramuscularly, daily for four days. Intramammary treatment consisted of 1 Gm. of dihydrostreptomycin sulfate in a commercial, water-in-oil emulsion vehicle. This cow produced more than 50 per cent of her expected milk yield when returned to milking in about ten days.

Field Case 5.—The symptoms of this cow were typical; one quarter was involved and her temperature was 104.8 F. This cow did not respond to the first intravenous dose of sodium sulfamethazine, although her temperature remained at the same level, so a second dose was given in six hours. In an additional six hours, the cow was still sick with a temperature over 104.0 F. She was given 5 Gm. of chlortetracycline intravenously every 12 hours for four doses without benefit. By this time, the cow had become extremely weak, emaciated, and there was evidence of pain in both hindlegs because of the inflammation in both hock joints. At this time, 5 Gm. of dihydrostreptomycin sulfate was given every 12 hours for six doses and 2 Gm. every 12 hours for three additional doses. During the five-day course of streptomycin therapy, the cow made a slow but steady recovery. The attack occurred during mid-lactation and she was lost from the production line for that lactation period. She apparently recovered but was culled from the herd.

Comment.—Numerous other case histories which were recorded and the experiences of several Connecticut practitioners confirm the finding that routine sulfamethazine therapy is followed by recovery in about 75 per cent of acute Klebsiella mastitis cases. The remaining 25 per cent have nearly always responded to intramuscular dihydrostreptomycin sulfate therapy.

EXPERIMENTAL PROCEDURE

Two cultures, isolated from the secretion of 2 cows with acute mastitis, were used. These cultures had been preserved on laboratory mediums at the Storrs (Conn.) Agricultural Experiment Station for over three years.

Identification of Cultures.—The cultures, labeled strains C-5 and MC, were members of the coliform group. Using the "IMVIC" method of classification suggested by Parr,[13] both strains fell into the classification of *A. aerogenes.* Both possessed large capsules. Strain C-5 was identified as Klebsiella, related to types 33 and 35, and strain MC was identified as Klebsiella, type 31. Neither of these strains was the same as strains isolated from mastitis secretions by Barnes,[9] namely, *Klebsiella pneumoniae,* type 4; *K. pneumoniae,* type 6; and *K. pneumoniae,* related to types 17 and 19.

Antibiotic Sensitivity.—Twenty-four hour, minimum inhibitory requirements of various antibiotics against the two strains were established. The tube-sensitivity test method was used (table 1).

TABLE 1—Antibiotic Sensitivity of Klebsiella Cultures After 24 Hours (Micrograms/Milliliter)*

Antibiotics	Strain C-5	Strain MC
Bacitracin	> 12.5	> 12.5
Carbomycin	>100.0	>100.0
Chloramphenicol	50.0	25.0
Chlortetracycline	6.2	3.1
Dihydrostreptomycin	>100.0	12.5
Erythromycin	>100.0	>100.0
Neomycin	3.1	3.1
Oxytetracycline	6.2	12.5
Penicillin G	>100.0	>100.0
Polymyxin B	>100.0	>100.0
Tetracycline	3.1	3.1

*Method described in Pelcak, E. J., Metzger, W. L., and Dornbush, A. C.: Comparative Effectiveness of Aureomycin, Chloromycetin, Penicillin and Streptomycin, in Vitro, Against Various Microorganisms Isolated from Hospital Patients. Harlem Hosp. Bull., 2, (1949): 47-54.

The results of the *in vitro* sensitivity tests indicated that tetracycline and neomycin are active against these organisms and may be considered desirable therapeutic agents to try experimentally against acute Klebsiella mastitis. At the time the observations made on the field cases reported herein were recorded, these antibiotics were not available. Barnes[9] has reported variable efficacy using oxytetracycline.‡ Buntain and Field[8] found chronic cases resistant to streptomycin but reported rapid clinical response to chlortetracycline intramammary

‡Terramycin,® Charles Pfizer and Co., Inc., Brooklyn, N.Y.

therapy. One interesting finding is that, although the C-5 strain is apparently resistant to streptomycin according to *in vitro* tests, the cow with an acute infection, from which this organism was recovered prior to initiation of therapy, responded to streptomycin treatment. Several practitioners in the northeastern United States were polled in December, 1955, and did not report resistance of the disease to streptomycin therapy. From western United States (California and Washington), reports of Schalm[4] and Hinze[12] stated that some cases of Klebsiella mastitis were resistant to streptomycin.

Mouse Toxicity.—Serial dilutions from cultures of each strain in concentrations of 1:10 to 1:1,000,000 organisms per milliliter of saline solution were made. Of each dilution of each culture, 0.5 ml. was injected intraperitoneally into two, 20- to 25-Gm. Swiss mice. Strain C-5 killed mice within three days postinoculation up to and including the 1:1,000 dilution. Mice receiving a higher dilution of strain C-5 survived. Strain MC killed mice within two days postinoculation up to and including the 1:10,000 dilution. Mice receiving high dilutions of strain MC survived. In all cases, the inoculated organism was recovered from the heart blood of the dead mice.

EXPERIMENTAL CASE HISTORIES

Case 1 (June 10, 1948).—An udder infusion cannula was dipped into a 24-hour, meat-infusion broth culture of organisms isolated from a cow with acute mastitis less than three weeks before. This was neither strain C-5 nor MC but was, at that time, identified as a capsulated Aerobacter and, so, it is reasonable to assume that it was Klebsiella. At 10:00 a.m., the cannula was passed into the right front quarter of a normal Brown Swiss cow about 5 years of age. The cow had been producing 25.0 lb. of milk daily. In three hours, the quarter was swelling and becoming hard and, within six hours, it was large and hard; the cow's temperature was 104.0 F. and she was shivering. At the eighth hour, the temperature was 106.4 F., the cow refused feed and, when milked, yielded only 4.5 lb. as compared to an expected 11.0 lb. At the ninth hour, 500 ml. of 25 per cent sodium sulfamethazine solution was given intravenously and, an hour later, the temperature had subsided to 102.7 F. By midnight, 14 hours after challenge, the quarter had started to soften slightly. The next morning, the temperature was 101.1 F. and it remained normal. The quarter was softer but the morning milking yielded only 4.7 lb. The cow was destroyed as a potential danger to the herd before further observations could be made.

The following 4 cases were all nondescript, normal, mature Holstein-Friesians which were infected with a mixed, washed suspension (5.0 on MacFarland scale) of strains C-5 and MC.

Case 2 (June 23, 1955).—At 8:05 a.m., this cow was challenged by dipping a 1-mm. glass rod into the suspension and introducing it into each right quarter. By the seventh hour, these quarters were swollen and hard and, an hour later, the secretion was thick with white clots and some strings. By the twelfth hour, when the temperature had risen to 105.6 F., 2 Gm. of tetracyline§ was given intramuscularly and tetracycline mastitis ointment was infused into each infected quarter. Milk production dropped somewhat on the second day but returned to normal on the third day. Abnormal milk persisted for one week and the organism spread to all four quarters. The udder swelling subsided by the end of the third day.

Case 3.—At 8:10 a.m., this cow was challenged in the same way as in case 2. The teat canals were so tight that most of the organisms were probably rubbed off. At the fifth hour, evidence of swelling was present. The udder became progressively harder and there was evidence of increasing pain and, by the eighth hour, there were abnormal secretions. No therapy was given. At the noon examination the following day, the udder had softened slightly and, late that afternoon, it felt normal. The temperature peak was 103.8 F. at noon of the first day, and this was transitory. Milk production decreased but returned to normal by the fifth day. Abnormal milk persisted for one week and the organism spread to all quarters.

Case 4.—At 8:15 a.m., this cow was challenged with 0.2 ml. of a suspension injected through a cannula into each right quarter. In two hours, the udder had started to swell and, by the third hour, had become extremely hot and hard. Swelling persisted for over a week. The milk became abnormal by noon and degenerated into a material that looked like blood serum containing fibrinous clots. The temperature of 107.0 F. was reached seven hours after challenge. No therapy was given. The temperature undulated between 103.8 and 106.0 F. for two days and tapered off to around 103.0 where it persisted for several days. The cow showed inappetence, stopped producing milk and, within two weeks, became totally

§Polyotic,® American Cyanamid Co., Lederle Laboratories Division, Pearl River, N.Y.

debilitated. The organism spread to all four quarters.

Case 5.—At 8:20 a.m., this cow was challenged in the same way as in case 4. In two hours, the milk was abnormal and the udder had started to swell. This case differed from case 3 only in that the cow did not develop a fever. Swelling reversed by the fourth day and milk production returned to normal in about one week, but the cow lost and never regained flesh. Abnormal milk persisted for one week and the organism spread to all four quarters.

Comments.—There was evidence of hard tissue (fibrosis or involution) in all of the infected quarters following the acute phase of the disease. The organism spread rapidly from the eight quarters which were challenged to the eight quarters which served as controls. No further evidence of infection, such as abnormal milk or a high leukocyte count, was observed in these quarters.

During the period from June 6, 1955, when all quarters were shedding the organism, until July 7 (28 days), the organism had spontaneously disappeared from all cows except in case 2. We do not know how long they would have persisted in the cow in case 2, as she received intramammary treatment in each quarter with tetracycline mastitis ointment on July 7 and was negative on all tests made weekly up to five weeks later.

DISCUSSION

The importance of the organisms causing Klebsiella mastitis to public health is yet to be determined. The relation of these agents to human intestinal disturbances, both adult and infant, is worthy of consideration.

We have also observed Klebsiella (capsulated Aerobacter) organisms as the cause of acute mastitis in swine and meningoencephalitis in young dairy calves.[12] The relation of these organisms to intestinal disturbances in farm animals is also deserving of consideration.

In the treatment of acute Klebsiella mastitis, success was almost directly related to the promptness of treatment after the onset of the disease. Sulfamethazine has been a satisfactory therapeutic agent. Following its administration, a sharp drop in temperature usually was apparent in six hours or less. When sulfamethazine therapy failed, streptomycin therapy was indicated.

Chlortetracycline, tetracycline, or neomycin should be considered as potentially effective therapeutic agents if the less costly drugs fail.

Lack of severity of the disease in 3 of 4 of the experimentally infected cows may have been due to decrease in virulence of the organisms which had been maintained in excess of three years on nutrient agar.

SUMMARY

Acute Klebsiella and acute capsulated coliform mastitis were shown to be the same entity.

It was also established that acute Klebsiella mastitis is not caused by a single serotype of the organism. Besides Klebsiella, type 31, and a Klebsiella related to types 33 and 35 reported here, mastitis caused by *Klebsiella pneumoniae*, type 4; *K. pneumoniae*, type 6; and a *K. pneumoniae* related to types 17 and 19 has also been reported.

Histories of 5 representative field cases and 5 experimentally produced cases of acute Klebsiella mastitis are reported. Sulfamethazine, streptomycin, or both were established as valuable therapeutic agents against acute Klebsiella mastitis.

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[13]Storrs Agricultural Experiment Station: Unpublished data.

What Is Your Diagnosis?

Because of the interest in veterinary radiology, the JOURNAL publishes this month, and will continue to do so for the next several issues, a case history and accompanying radiographs depicting a diagnostic problem.

Make your diagnosis from the picture below—then turn the page ▶

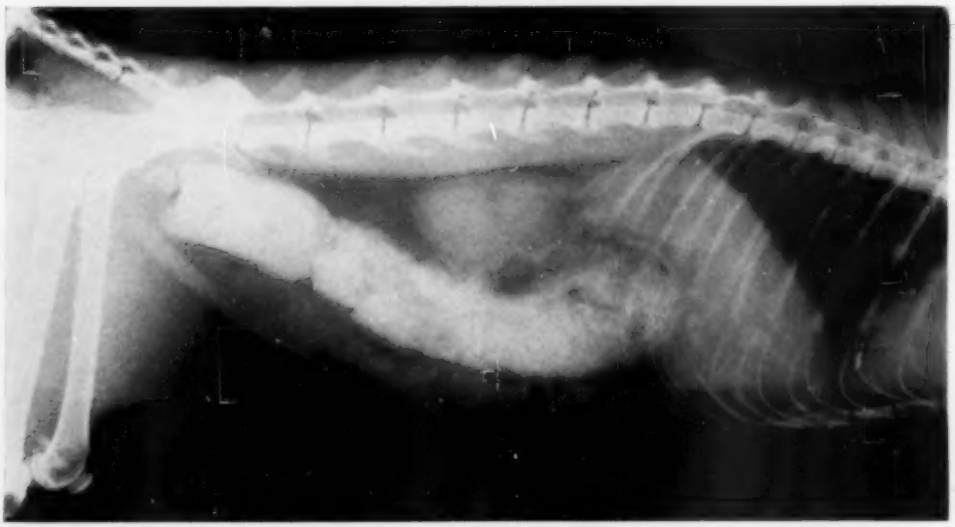

Figure 1

History.—A male cat, 9 years old, refused to eat and strained as if attempting to defecate. The abdomen was distended and a hard mass could be palpated in it. The bladder could not be palpated. The cat had free range outdoors. The fecal material consisted chiefly of digested bones, probably those of an ingested chicken carcass.

(Diagnosis and findings are reported on the next page.)

Here Is the Diagnosis

(*Continued from preceding page*)

Diagnosis.—Impaction of the colon.

Comment.—Technically, this is an exceptional radiograph. The detail is shown clearly in figure 2: 1—heart, 2—lung fields; 3—a bronchus; 4—liver; 5—kidney; 6—impacted colon; 7—cecum; 8—small intestine; 9—the prepubic tendon.

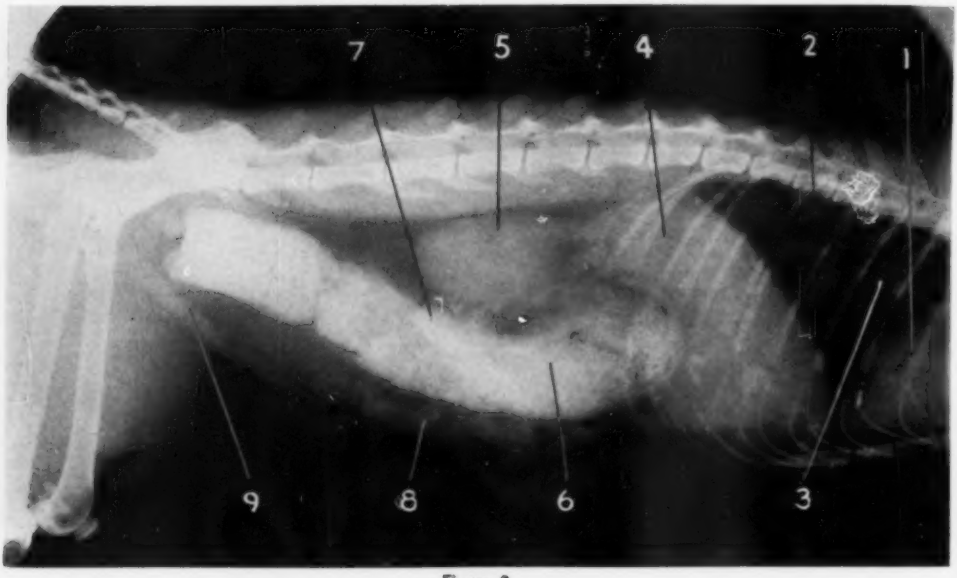

Figure 2

This case was submitted by Drs. A. G. Schiller and D. D. Maksic, College of Veterinary Medicine, University of Illinois, Urbana.

Our readers are invited to submit case histories, radiographs, and diagnoses of interesting cases which are suitable for publication.

Bluecomb Disease of Turkeys
II. Antibiotic Treatment of Poults

J. McN. SIEBURTH, Ph.D., and B. S. POMEROY, D.V.M., Ph.D.

St. Paul, Minnesota

IN 1951, Peterson and Hymas[1] reported that, when antibiotics were instilled into the crop of growing turkeys infected with bluecomb disease, death losses stopped and recovery was speeded. Since that time, antibiotics have been used widely for the treatment of bluecomb disease in turkeys of all ages. In growing and mature birds, in which death losses seldom exceed 25 per cent, good results have been obtained when treatment has been started early in the disease and continued until symptoms have disappeared.

In the young poult, bluecomb disease is much more severe and mortality may approach 100 per cent. Poult mortality may be reduced up to 70 per cent by antibiotic supplementation of the feed at a rate of 500 p.p.m.[2] However, when active infection exists in poults in a brooder house and new groups of poults are added at regular intervals, the mortality of untreated groups increases from hatch to hatch and the efficacy of the antibiotic treatment is reduced.[2]

Since young poults consume approximately three times as much water as feed,[3] it appeared possible that water medication might be more effective than feed supplementation. The results of experimentally treating bluecomb-infected poults, under continuous brooding conditions, with antibiotic-supplemented drinking water are here reported.

MATERIALS

The trials were performed in brooder houses in which bluecomb disease was well established by previous hatches of poults. The poults were from eggs the turkey grower had set from his own breeding flocks prior to the appearance of bluecomb disease. The poults were put on experiment at 1 day of age, medicated water was freshly supplied daily in all-glass fonts, and daily mortality records were kept. The method of brooding depended on facilities on the farm where the experiment was conducted.

Experiment 1.—Three gas brooder stoves and 360 poults were used. In order to prevent the birds from getting caught in the wire floor, an area under each stove was covered with a rough paper. Each of the three stoves was ringed with galvanized sheet iron to form a pen which was subdivided into four sections by wire netting. Thirty Beltsville Small White poults were placed in each of the 12 sections. The treatments varied in each section of the pen, but the three pens were replications of each other.

Experiment 2.—A wire-floored, electrically heated battery brooder was used. The battery was divided into six pens with 25 Broad Breasted Bronze poults in each pen, a total of 150 birds.

Experiment 3.—The experiment was conducted in a brooder house with a cement floor covered with new peat moss litter. Each of four gas brooder stoves was ringed with corrugated paper to form an undivided pen. The four pens were maintained under different regimens and each contained 300 Beltsville Small White poults, a total of 1,200 birds.

METHODS AND RESULTS

In experiment 1, preparations of three commercial antibiotics were added to the drinking water, each at a rate of 250 p.p.m. of active ingredient. The results obtained with each antibiotic, with the exception of streptomycin, were similar. The average results with aureomycin® and streptomycin are presented in graph 1. With aureomycin soluble, the most effective preparation, mortality was reduced by some 66 per cent. With streptomycin (vetstrep®), results were highly variable; one group had the highest mortality, another had one of the lowest, while the average result was a slight reduction in mortality.

In these trials, poults receiving drinking water containing terramycin® poultry formula (TPF) consistently died at a rate greater than the controls. Since earlier work had shown that TPF, at 500 p.p.m. in turkey poult feed,[2] caused no ill-effects and was effective against bluecomb in older

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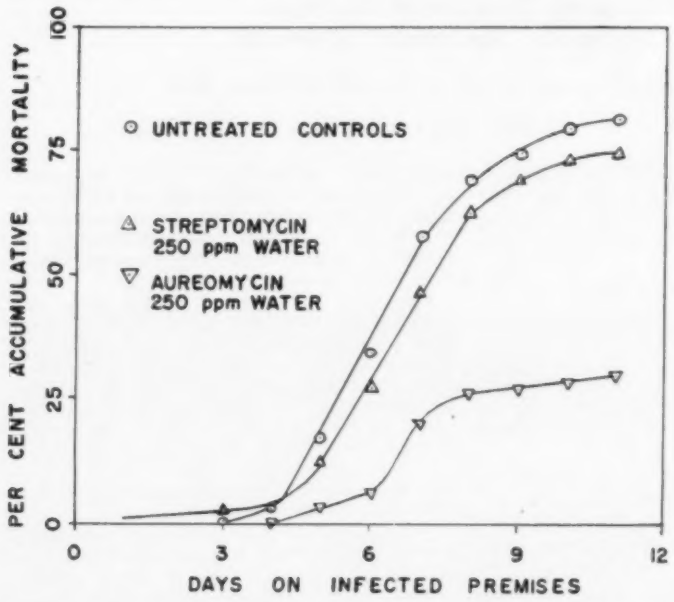
Article No. 3209, scientific journal series, Minnesota Agricultural Experiment Station, St. Paul.

Dr. Sieburth's present address is Animal Pathology Section, Virginia Agricultural Experiment Station.

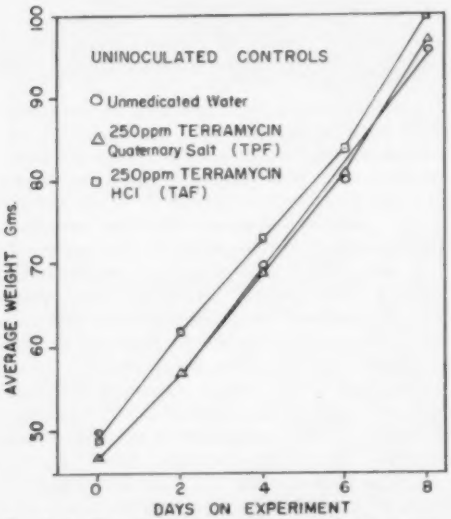
This investigation was supported in part by grants from the Minnesota Turkey Growers' Association, the National Turkey Federation, Lederle Laboratories, Chas. Pfizer and Co., Inc., and Hess and Clark, Inc.

Aureomycin soluble was furnished by Lederle Laboratories, vetstrep by Merck and Co., terramycin poultry formula and terramycin animal formula by Chas. Pfizer and Co. Inc., and furazolidone (NF 180) by Hess and Clark.



Graph 1—The effect of antibiotic-supplemented drinking water on bluecomb-infected poults.

birds, further studies were undertaken to determine the cause of this increased mortality. Using concentrations of 250 p.p.m. in the drinking water, TPF was compared with terramycin animal formula (TAF), a soluble pure form of terramycin, against both normal and bluecomb-infected poults.



Graph 2—The effect of terramycin products on normal poults.

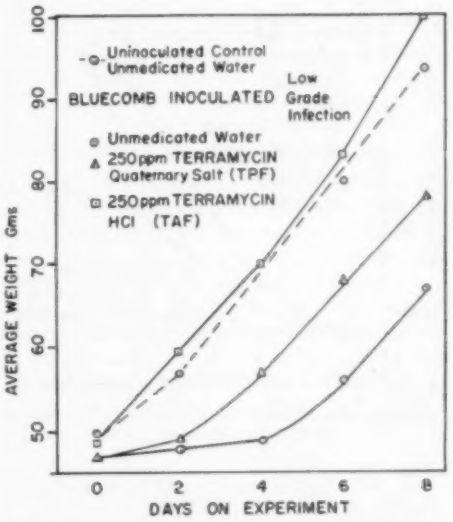
Poults fed pure terramycin, as TAF, made a consistently better growth and rate of gain than did the controls and TPF-fed poults (graphs 2 and 3). At concentrations of 500 p.p.m. in drinking water, these differences in favor of the TAF were even more pronounced (24% growth by 10th day), while poults treated with TPF failed to gain weight and all were dead by the eighth day.

It was later learned that the terramycin quaternary salt, on which TPF is based, has a maximum water solubility of approximately 100 p.p.m., whereas the terramycin hydrochloride in TAF is more soluble. Solubility criteria obviously do not apply to the use of TPF in feeds.

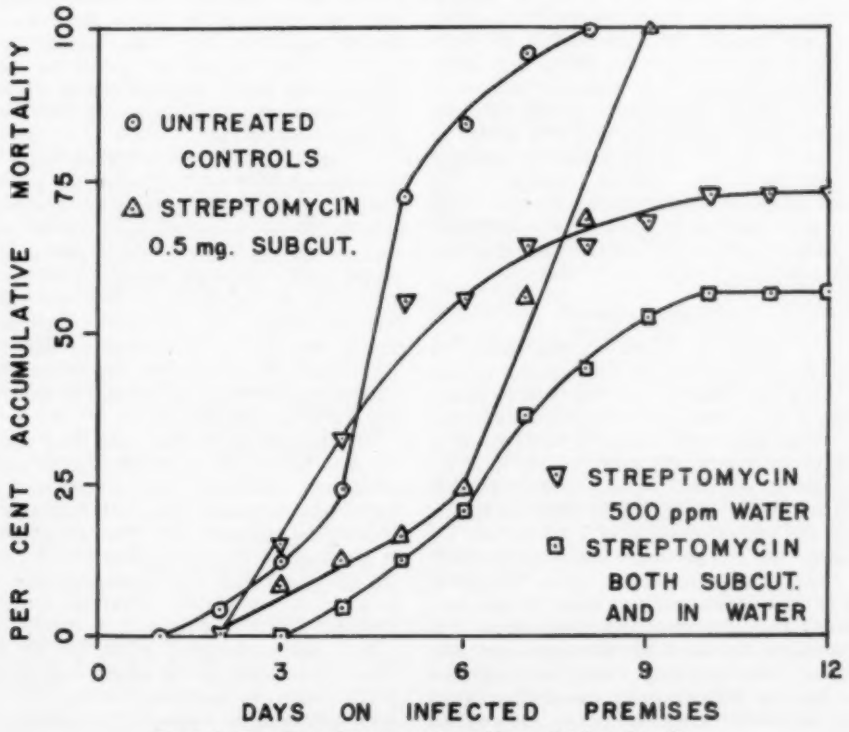
In experiment 2 (graph 4), streptomycin was administered either subcutaneously at 1 day of age (0.5 mg. of dihydrostreptomycin sulfate per poult), or in the drinking water (vetstrep at 500 p.p.m.), or both these methods. Following the small subcutaneous injection, mortality appeared to be delayed for two days only. Mortality in the group receiving medicated drinking water was no lower than in the controls until after the fifth day, when 50 per cent mortality had occurred. A lower over-all mortality occurred in the group in which both treatments were used.

In experiment 3 (graph 5), the streptomycin injection (0.5 mg. at 1 day of age) apparently had no effect by itself. When either streptomycin or aureomycin were added to the drinking water in addition to the subcutaneous streptomycin, the course of the disease was altered. Death losses in both groups were held down until the fifth day, when streptomycin appeared to lose its effectiveness while aureomycin maintained its effectiveness (about a 50% mortality).

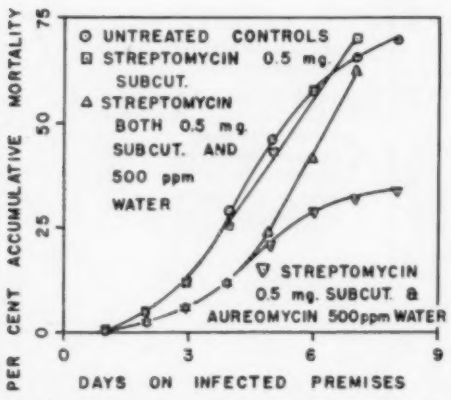
During the testing of a furazolidone mixture (NF 180®) against paratyphoid infections in the turkey poults, uninoculated controls maintained on diets, with and without medication, became infected with bluecomb disease. The course of the disease in the treated groups was altered as compared to the untreated groups. Several trials were conducted on the same farms on which experiments 2 and 3 were performed. From 30 to 300 poults were used per group. With a feed supplemented with 50 p.p.m. of furazolidone, the course of the disease



Graph 3—The effect of terramycin products on the weight of poults with a low grade bluecomb infection.


UNTREATED CONTROLS
STREPTOMYCIN 0.5 mg. SUBCUT.
STREPTOMYCIN 500 ppm WATER
STREPTOMYCIN BOTH SUBCUT. AND IN WATER
PER CENT ACCUMULATIVE MORTALITY
DAYS ON INFECTED PREMISES

Graph 4—The effect of streptomycin on bluecomb-infected poults.



Graph 5—The effect of streptomycin and aureomycin on bluecomb-infected poults.

was not affected and, with 100 to 200 p.p.m., it was only temporarily altered.

During the course of these and other field trials, some empirical observations were made. Bluecomb disease was never observed to recur in recovered flocks. Healthy turkeys from flocks free from bluecomb disease have contracted the condition when housed with birds that have experienced bluecomb disease sometime during their growing period. Poults, hatched from eggs from breeding flocks on the same farm where bluecomb disease existed in young poults, remained well when taken out of the hatchery under rigid sanitary conditions. None of the different growers to whom the poults were taken experienced any trouble with them.

Discussion

In a previous report on the effect of antibiotic-supplemented feed on the course of bluecomb disease in the young poult, when aureomycin, penicillin, streptomycin, or terramycin were added to the feed at a rate of 500 p.p.m., the mortality declined by at least 50 per cent. In this study, commercial antibiotic preparations that are available for water medication were tested, including the tetracyclines and streptomycin.

When aureomycin was used, the mortality was consistently at least 50 per cent lower. This observation differs from that previously reported by Pomeroy and Sieburth.[2] The discrepancy may be accounted for by the fact that in the earlier work the antibiotic used was pure crystalline, aureomycin hydrochloride which deteriorates rapidly in water while, in this study, aureomycin soluble, which is buffered with citric acid to make it more stable in water, was used.

The results with streptomycin were highly variable, not only between experiments but between replicate groups in the same experiment. With the subcutaneous injection, the course of the disease, at best, was delayed 48 hours. With medicated water, later mortality was held down while the combination treatment resulted in a lower, over-all mortality. At times, all three treatments failed to alter the course of the disease.

Bluecomb disease-infected poults maintained on water containing terramycin quaternary salt, as TPF at a calculated terramycin activity of 250 p.p.m., succumbed earlier than untreated controls. Although the same concentration of this product in the drinking water of uninfected poults had no adverse effect, twice the concentration not only failed to go into solution but appeared to be unpalatable. The poults were reluctant to drink, failed to gain weight, and all were dead by the eighth day. Obviously, this product should not be administered to poults or other birds in the water at a calculated terramycin concentration in excess of the recommended 100 p.p.m.

A corresponding toxic effect could not be demonstrated for TAF and this product, consisting of pure terramycin hydrochloride buffered with citric acid, is more soluble. On the basis of these trials in experimentally infected poults, TAF would appear to be superior to TPF for use in the treatment of bluecomb disease in poults. Because of its increased solubility, TAF must be used when terramycin concentration in excess of 100 p.p.m. in drinking water is required.

A furazolidone mixture has been used in the field for treating a number of intestinal infections. Although this preparation has been found to be effective in treating mixed paratyphoid infections when incorporated in the feed at a rate to yield 200 p.p.m. of the furazolidone,[4] this treatment had only a slight and transient effect on bluecomb disease.

No treatment with antibiotic or with other chemotherapeutic agents has stopped death losses in starting poults. Although some treatments, were highly beneficial at times, the most that can be expected is a

50 per cent reduction in death losses. Besides the loss from mortality, there are also marked losses from morbidity. It appears that in the young poult, at least, antibiotic treatment is not satisfactory, especially when further hatches are started while bluecomb-infected birds are still on the premises. Under these conditions, the infected brooder house should be depopulated for several weeks and the house and all equipment should immediately be thoroughly cleaned and repeatedly disinfected. Rigid isolation of starting poults and good sanitation should also be practiced. This procedure has been tried on two farms used in these trials with good success.

CONCLUSIONS

1) The use of aureomycin® (250 p.p.m. of drinking water) consistently reduced the mortality of bluecomb disease-infected poults by 50 per cent.

2) When streptomycin (vetstrep®) was administered in the drinking water, subcutaneously, or by both routes, the course of the disease was not consistently altered.

3) Use of terramycin® quaternary salt preparation, terramycin poultry formula (TPF), not only failed to protect the poults against bluecomb disease but appeared to aggravate the condition. In comparative studies, with normal and infected poults, the use of terramycin hydrochloride at 250 p.p.m., as terramycin animal formula (TAF), soluble power resulted in consistently better growth of birds than in the control and TPF-medicated groups.

4) Antibiotic treatment of bluecomb disease is of little value when additional hatches of poults are started on the same premises. The chain of infection can be broken only by depopulation of the infected brooder houses, followed by intensive cleaning and chemical disinfection. Starting poults should be kept isolated and rigid sanitary precautions enforced.

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[4]Pomeroy, B. S., and Becker, Alvin: Unpublished field trials.

Filtration by Lymph Nodes.—The popliteal lymph nodes of the rabbit removed 91.0 per cent of anthrax spores, 99.97 per cent of vegetative anthrax organisms, 79.0 per cent of *Bacillus subtilis* spores, and 81.0 per cent of vegetative forms of *B. subtilis*. —*Vet. Bull., Feb., 1956.*

Experimental Brucellosis in Sheep

Of 9 rams inoculated intravenously with *Brucella abortus*, in New Zealand, 2 developed infection. They secreted organisms in their semen but lesions could not be detected in their external genital organs.

Of 12 ewes similarly inoculated about five weeks after breeding began, 2 failed to conceive and 7 others developed active infection, with 5 giving birth to dead lambs after 102 to 137 days.—*Vet. Bull., Feb., 1956.*

Newcastle Disease and Pigs

Seven pigs inoculated intracerebrally with Pakistan and Madagascar strains of Newcastle disease virus (NDV) became paralyzed after an illness resembling Teschen disease. Necropsy revealed central nervous system lesions of that disease. Only after five intracerebral passages in pigs did the virus become pathogenic for the pigs by the nasal route. After the third passage, the virus was not pathogenic for chickens but protected them against NDV. The fourth to seventh passage material produced neither disease nor immunity in chickens.

Four pigs immune to Teschen disease survived intracerebral inoculation of NDV. Nine chickens inoculated with Teschen disease virus showed no reaction or protection against NDV.—*Vet. Bull., Feb., 1956.*

Teschen Disease Virus and Vaccine.—Teschen disease virus, cultivated on porcine embryonic tissue, caused typical symptoms and death in all pigs inoculated intracerebrally. A formalized aluminum hydroxide-absorbed vaccine made from this virus was safe and effective against challenge with large doses of the virus.—*Vet. Bull., Feb., 1956.*

Histology of Brain of Dogs with Distemper.—When brain material of 17 dogs with the nervous form of distemper or with hard pad disease were studied, there were no histological differences between the two groups.—*Vet. Bull., Jan., 1956.*

Editorial

Electing AVMA Presidents

The method of electing AVMA presidents has been a topic for discussion for as many years as the organization itself has existed. The fact that this subject is receiving renewed attention is not a reflection on the present or past officers but, instead, is an indication of the desire of the membership to make sure that the men the Association elects as its chief executives are truly representatives of the profession as measured over a period of years.

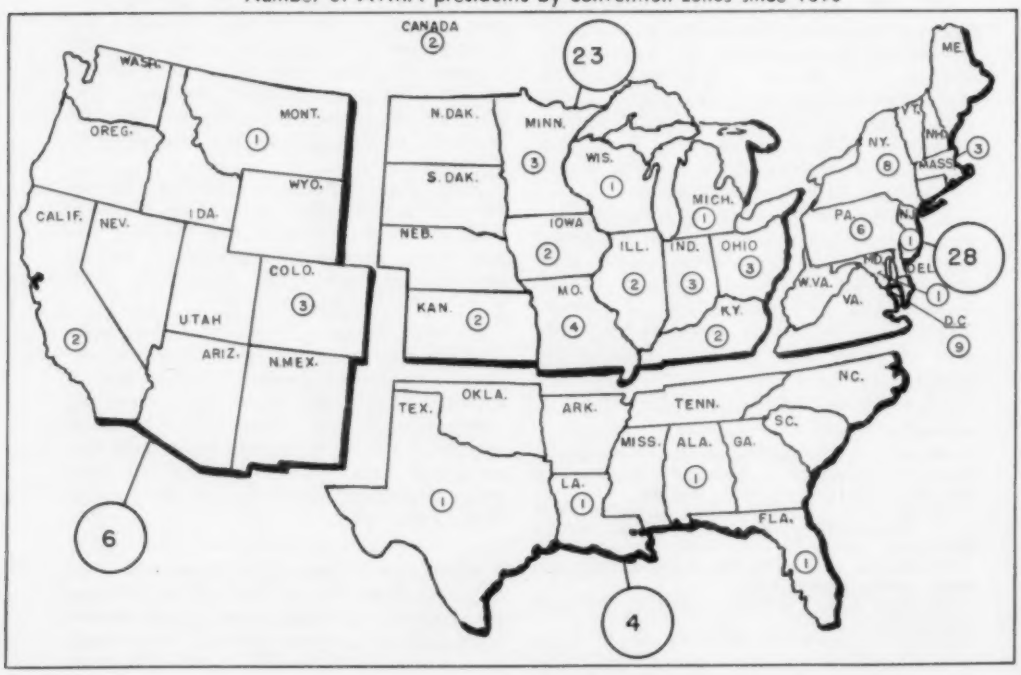
At the 1935 AVMA meeting in Oklahoma City, amendments to the Bylaws were adopted which created the office of president-elect (electing the president one year in advance of his taking office). That same year (1935), a proposed amendment providing for the nominations for president (or president-elect) to be made by the House of Representatives, with the election to be conducted by a mail ballot, was defeated.

Proposal by Executive Board

At the 1953 AVMA convention in Toronto, the House of Representatives instructed the Executive Board to again study this subject. A special committee of the Board devoted considerable time in developing their recommendations.

The Executive Board's proposal provided for a nomination form to be published in the JOURNAL to provide each member the privilege of submitting one name as a nominee for office. The six members receiving the highest number of nominating votes would then be designated as candidates, provided they would agree to accept the office, if elected. Their names would then appear on the ballot published in one of the March issues of the JOURNAL. The polls would close May 15 and the candidate receiving the majority of the votes would be declared the president-elect. This proposal, when presented to the House at the Minneapolis meeting, was not adopted.

Number of AVMA presidents by convention zones since 1890



The Executive Board is again engaged in a study of this problem.

Present Method Not Satisfactory

Two objectives that apparently can not be assured by the present method of electing AVMA officers are—(1) to have more practitioners serve as AVMA presidents, since 66 per cent of AVMA members are in practice, and (2) to have all the membership feel that they have a voice in the election.

While a change in the method of election could not in itself accomplish the objective of having more practitioners as presidents of the AVMA, it might, if properly designed, at least stimulate the development of a slate of nominations that would include practitioners each year.

A change in the method of election that would permit each member to exercise his franchise must of necessity be designed within the framework of practicability and workability and, at the same time, be safeguarded to prevent domination of elections by one or two areas of concentrated veterinary populations.

Sixty-three men have been chosen as president since 1890 (66 years). R. S. Huidekoper served a two-year term, 1890-1892; W. Horace Hoskins, a three-year term, 1893-1896; and James Farquharson, a two-year term, 1944-1946.

Past-Presidents

Of these 63 men, 19 (30.1%) were members of veterinary college faculties; 17 (26.9%) were in private practice; 12 (19.0%) were state livestock sanitary officials; 6 (9.5%) were federal employees; 4 (6.3%) were employees of commercial concerns; 3 (4.7%) were members of the Armed Forces, and 2 (3.1%) were veterinary officials of the Canadian government.

The geographical distribution of AVMA presidents since 1890 indicates that 28 (44.4%) have resided in the eastern states: 9 in the District of Columbia; 8 in New York; 6 in Pennsylvania; 3 in Massachusetts; 1 in New Jersey; and 1 in Maryland.

Twenty-three (36.5%) have resided in the North Central states: 4 in Missouri; 3 each in Ohio, Indiana, and Minnesota; 2 each in Illinois, Iowa, Kansas, and Kentucky; and 1 each in Wisconsin and Michigan.

Six (9.5%) have been from the West: 3 from Colorado; 2 from California; 1 from Montana; and 4 from the South: Texas, Louisiana, Alabama, and Florida.

As previously mentioned, 2 past presidents have been from Canada.

In the last 32 elections, the president-elect was chosen from the state where the meeting was held only four times (Wells, 1950, Florida; Way, 1938, New York; Brumley, 1936, Ohio; and MacKellar, 1934, New York).

In slightly more than one half of these elections, the president or president-elect was from the convention zone where the meeting was held. (For example, Quin, 1953, Toronto; Coffee, 1949, Detroit; Hagan, 1946, Boston; Bower, 1942, Chicago; Dimock, 1941, Indianapolis; Jakeman, 1940, Washington.) However, convention zones are large and this figure is not significant.

Proposal that Nomination of President-Elect Be a Function of the House

When the AVMA House of Representatives was established during the 1933 meeting in Chicago, it was empowered to exercise all of the duties and assume all the powers, except the election of officers, which previously had been delegated by the Constitution and Bylaws to the active members of the Association.

Much progress has been made in 22 years in establishing a recognition of the responsibility and obligations that the delegates hold to the members of the constituent associations they represent.

A proposal which seems worthy of serious reconsideration is that the nomination of the president-elect be made a function of the House of Representatives; in this plan, each delegate would be provided with an opportunity of expressing the opinion of the AVMA members in the association he represents regarding the slate of nominations from which the president-elect would be selected. It has been suggested that the election be held either (*a*) in the House of Representatives, (*b*) by ballot during the annual meeting, or (*c*) by a mail ballot to the entire AVMA membership. A thorough study of these suggestions might provide a partial, if not a complete, solution to this problem. Expressions with regard to this method or to other proper methods of electing our presidents will be welcomed by the AVMA.

Current Literature

ABSTRACTS

Intravenous Infusions in Cattle

A comparative study of the utilization of intravenous infusions of glucose, invert sugar, and fructose in cattle at the rate of 0.5 Gm. per kilogram of body weight is reported. Total blood sugar values returned to normal two hours following invert sugar treatment, six hours after glucose, and were slightly above normal six hours after treatment with fructose.

Marked diuresis occurred in animals following glucose and fructose infusions, with less diuresis after treatment with invert sugar. There was a tendency for less sugar to be excreted in the urine following fructose or invert sugar than following glucose infusions. The fructose-treated and invert sugar-treated animals excreted similar quantities. Thus, the utilization of invert sugar by the body tissues over a given period was greater than that for either fructose or glucose alone.

The possible advantages of invert sugar therapy over glucose therapy in metabolic disorders of cattle such as ketosis are discussed.—[*Dennis D. Goetsch, Gravers K. L. Underbjerg, and Melvin J. Swenson: The Utilization of Intravenously Administered Glucose, Invert Sugar, and Fructose in Cattle. Am. J. Vet. Res., 17, (April, 1956): 213-216.*]

FOREIGN ABSTRACTS

Chloral Hydrate for Acetonemia in Cattle

The intravenous injection of 20 to 25 Gm. of chloral hydrate, two doses 36 hours apart, has been found effective in the treatment of acetonemia.—[*Theising: The Treatment of Acetonemia in Cattle with Chloral Hydrate. Der Praktische tierärztl., 1, (1956): 4.*]—F.K.

Sea Water in the Treatment of Demodex Mange in Dogs

The authors, faculty members at the College of Veterinary Medicine at the University of the Republic of Uruguay, have been investigating the problem of demodex mange for several years. They believe that results reported on the efficacy of various treatments should be interpreted not only in improvement of the skin but only after long follow-ups inasmuch as practically every treatment will cause some improvement. Also, the condition is subject to spontaneous remission.

The treatment which has given them the best results consists of intra-abdominal injections of sterile sea water at the rate of 0.5 cc. per kilogram of body weight three times a week for 25 to 30 injections. The dose should not exceed 10.0 cc. for any size dog. They point out that it should not be given to dogs in heat or to weak animals. Of 25 dogs treated, which were followed up for five years, 24 had no evidence of remission. The rationale of this treatment is believed to be biochemical.—[*V. H. Bertullo, and T. Pilz: Un Nouveau Traitement de la Démodoxie Canine. Rec. méd. vét., 132, (Feb., 1956): 112-120.*]—J.P.S.

Observations on Bovine Metritis

Preliminary observations on bacteriological flora in bovine metritis were carried out in a total of 49 animals. Of 54 microorganisms isolated, 36 were of the coliform group and the others were distributed as follows: staphylococci, 10; streptococci, 3; *Corynebacterium pyogenes*, 3; *Serratia marcescens*, 1; and diphtheroid Bacillus, 1.

Attention is called by the author to the incidence of the coliform group.—[*Paulo M. G. de Lacerda, Jr.: Preliminary Observations on Bovine Metritis. Rev. da Fac. de Med. Vet., 5, (1953-1954): 73-76.*]—G.T.E.

BOOKS AND REPORTS

National Formulary

The recently published tenth edition of the "National Formulary" is one of the most extensive revisions of its 67-year history. It is the result of work of the Committee on National Formulary, supplemented by advisory committees, and extending over a five-year period.

In the process of revision, 243 items were deleted. Of the 733 monographs included, 128 cover extensively used drugs of therapeutic importance for which official standards would not otherwise be provided, such as the amphetamine phosphates, mephobarbital, nitrofurazone, and inositol. In most instances, dosage forms have been provided for any basic drug admitted to the tenth edition of the Formulary.

Despite the inherent limitations on scope, because of the legal status of the book, a section on general information has been added as a new and useful feature. This section presents information on balances, weights, and measuring devices; chiropody-podiatry drugs; clinical laboratory reagents and staining solutions; certified coal tar colors; the International Pharmacopoeia; optical crystallographic characteristics of drugs; and a chapter on sterilization.

The Formulary is a useful reference on the characteristics of a large number of widely used drugs and therapeutic preparations.—[*The National Formulary. Compiled and edited by the Committee on National Formulary. 10th ed. 867 pages. J. B. Lippincott Co., Philadelphia. 1955. Price $9.00.*]

Catalog (Not Books) Is Free

The July, 1955, issue of the JOURNAL, under "Book Reviews" (page 81), carried an item entitled "A Free Library of Books on Horses," which was an error. The catalog, listing 800 different books on horses, may be obtained free by writing Ken Kimball, Plant City, Fla., but the books are not free.

Dr. C. A. Brandly Appointed Dean at University of Illinois

Dr. Carl A. Brandly will become dean of the College of Veterinary Medicine, University of Illinois, on Sept. 1, 1956. He is at present chairman of the Department of Veterinary Science, University of Wisconsin.

Dr. C. A. Brandly

Born at Fairview, Kan., in 1900, Dr. Brandly received his high school education at Burlington, Kan., and his D.V.M. at Kansas State College in 1923.

In his eventful career, Dr. Brandly served as bacteriologist for a serum company for four years; as a BAI regulatory control inspector for six months; as poultry disease investigator at Kansas State College for nine years; as pathologist at the University of Illinois for three years; as senior pathologist, U. S. Regional Poultry Research Laboratory, East Lansing, Mich., for four years; and as director of the War Research Program on certain exotic virus diseases at Harvard University for over two years. He joined the staff at the University of Wisconsin in December, 1945, and has served as the elected chairman of that department since 1946.

Dr. Brandly is the author or co-author of some 80 articles dealing with the investigation of animal diseases and is co-author (with E. L. Jungherr) of "Advances in Veterinary Science," the first volume of which was published in 1953, the second in November, 1955.

Dr. Brandly has been a member of the Research Council of the AVMA since 1942 and is now its chairman. He has also served on many other important boards and committees. He is an associate editor of the *Journal of Virology* and of the *Cornell Veterinarian*.

Dr. and Mrs. Brandly will move to Urbana from their home in Madison, Wis., in August.

Laboratory Course in Electron Microscopy

The summer laboratory course in the techniques and applications of the electron microscope will be given again this summer from June 11 to June 23, 1956, by the Laboratory of Electron Microscopy in the Department of Engineering Physics, Cornell University, Ithaca, N. Y. The course, under the direction of Professor Benjamin M. Siegel, will have the following guest lecturers: Drs. Cecil E. Hall of Massachusetts Institute of Technology, Cambridge; and Robley C. Williams of University of California, Berkeley.

The course is designed to give members an intensive survey of basic theory and interpretation of results. The registration is limited to a small group so that ample facilities are available for each one to pursue laboratory work in his special field at an introductory or advanced level, depending on his previous experience. Further inquiries should be addressed to Professor Benjamin M. Siegel, Department of Engineering Physics, Rockefeller Hall, Cornell University, Ithaca, N. Y.

U. S. GOVERNMENT

Dr. Mootz Retires.—Dr. Charles E. Mootz, inspector-in-charge at Philadelphia, retired from the service on March 31, 1956, after more than 40 years of service in various positions in federal meat inspection. Dr. Mootz previously served as inspector-in-charge at Duluth, Minn.; Mason City, Iowa; and Detroit, Mich. He plans to live in Ohio.

s/F. L. Wilde *Administrative Officer.*

AMONG THE STATES AND PROVINCES

Alabama

State Association.—The forty-ninth annual convention of the Alabama Veterinary Medical Association was held in Montgomery on March 18-20, 1956. The meeting was one of the most

Dr. S. F. Scheidy is welcomed by Lt. Col. R. L. Hummer on his arrival to address Alabama veterinarians.

Brigadier General Kester addressing veterinarians of Alabama at the forty-ninth annual meeting of the state Association.

interesting and best attended that has been held by this group.

During the scientific session, outstanding presentations were made by John P. Fox, Tulane University (human Flury vaccine, rabies); Asa Winter, Animal Disease Eradication Branch, U.S.D.A. (brucellosis); Brig. Gen. Wayne O. Kester, Office of the Surgeon General, U.S. Air Force, Washington, D. C., and president-elect of the AVMA (background for progress; and veterinary public health); S. F. Scheidy, Sharpe and Dohme Laboratories, West Point, Pa. (leptospirosis; and adrenocortical hormones in veterinary practice); V. J. Cabasso, Lederle Laboratories, Pearl River, N. Y. (control of canine viruses).

Brigadier General Kester (left), Dr. Sledge, president of the Association, and Lt. Col. Hummer, chairman of the local committees, discussing a new pamphlet on rabies, as civilian and Air Force veterinarians joined to present one of the most successful meetings ever held in Alabama.

Other interesting subjects on the program were: veterinary public health, legal problems, civil defense, animal disease research, large animal practice, cattle and swine diseases, and recent developments in veterinary therapy.

Dr. J. W. Hazelrig, Birmingham, was elected to succeed Dr. J. L. Sledge, Greensboro, as president of the Association. Other officers elected were: J. E. Greene, Auburn, president-elect; T. M. Miller, Dothan, vice-president; and M. K. Heath, Auburn, secretary-treasurer. The following were elected to the executive board: Ray Dunlap, Guntersville; W. H. Harrell, Enterprise; and J. L. Sledge, Greensboro.

s/JAMES R. HALSTEAD, *Publicity Committee.*

Arizona

Central Association.—The Central Arizona Veterinary Medical Association held its regular monthly meeting at Tang's Rice Bowl Restaurant in Phoenix on March 13. Dr. D. Hott of Phoenix was host. Mr. H. Ruppelius, Speaker of the House of the Arizona Legislature, gave a talk on legislative procedures.

The annual election of officers was held with the following results: A. Raimondo, Hosa, president; K. Maddy, Phoenix, vice-president; E. Powell, Scottsdale, secretary-treasurer; and J. Carney, Chandler, member-at-large.

s/KEITH T. MADDY, *Retiring Secretary.*

Connecticut

Fairfield County Association.—Mr. Alden A. Ameden, former head of Norwalk Civil Defense, was guest speaker at the March 14 meeting of the Fairfield County Veterinary Medical Association at Chimney Corners Inn in Stamford. He described his experiences as a civil defense observer in the recent atom bomb tests in Nevada. s/WILLIAM R. LEGGETT, *Secretary.*

Indiana

Busy Retirement for Dr. Gillie.—An item in the *St. Petersburg Times* (Fla.) of March 11, 1956, tells of Dr. George W. Gillie's visit to the home of a classmate, Dr. A. J. DeFosset of Belle Vista Beach, and some of the activities which keep the former congressman from Fort Wayne busy. In addition to the operation of his farm, Dr. Gillie is president of the Mizpah Shrine Mounted Patrol; chairman of the Humane Commission at Fort Wayne; director of Fort Wayne and Allen County Historical Society; and consultant in the U. S. Department of Agriculture, Agricultural Research Service.

s/MRS. F. OLMSTEAD (*Nevada, Mo.*).

Massachusetts

State Association.—At the March 28 meeting of the Massachusetts Veterinary Association in Boston, Mr. L. T. Maloney, Professional Relations Research Institute, Inc., Boston, discussed public relations.

s/C. LAWRENCE BLAKELY, *Secretary.*

Michigan

Veterinary Symposium Sponsored by State V.M.A.—Recently, a very successful symposium on veterinary medicine, sponsored by the Michigan State Veterinary Medical Association, was held in Grand Rapids, with more than 200 in attendance. Those responsible for planning the symposium were: Peter Babich, Flint, president of the Michigan Association; M. C. Bigelow, Flushing, moderator of the afternoon session; W. O. Brinker, of the faculty of the College of Veterinary Medicine, Michigan State University, East Lansing, program chairman; J. F. Donovan, Detroit, moderator for the morning session; and Paul V. Howard, Grand Rapids, secretary-treasurer of the state Association.

Those responsible for the success of the symposium on veterinary medicine were (seated, left to right)—Dr. Peter Babich, M. C. Bigelow, W. O. Brinker, J. F. Donovan, and (standing) Paul V. Howard.

• • •

Southeastern Association.—The following officers have been elected to serve the Southeastern Michigan Veterinary Medical Association for 1956: John F. Donovan, Detroit, president; A. W. Emery, Waterford, vice-president; Chas. Hodder, Detroit, treasurer; Gilbert Meyer, Detroit, secretary; Leonard Schreiber, Detroit, and Jerry Hergott, Dearborn, directors.

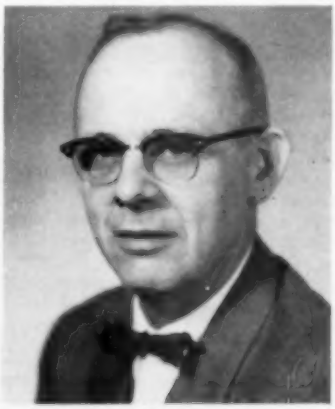
At the March meeting, a film, "Friend of a Friend," was shown.

s/GILBERT MEYER, *Secretary.*

• • •

Dr. L. C. Ferguson to Join Faculty at Michigan State University.—Dr. L. C. Ferguson will become head of the Department of Microbiology and Public Health, College of Veterinary Medicine, Michigan State University, this fall.

Dr. Ferguson was born and raised near Lebanon, Ind., and received his veterinary education at Ohio State University. After graduation, in 1934, he served on the staff of the Department of Veterinary Science at the University of Wisconsin, where he received his M.S. degree in 1936 and his Ph.D. in 1940. He later served in the Veterinary Corps, U. S. Army, for over five years, attaining the rank of major. Since October, 1946, he has been on the staff of the Department of Bacteriology, School of Veterinary Medicine, Ohio State University, for seven years, and at the Ohio Agricultural Experiment Station at Wooster for about three years.



Dr. L. C. Ferguson

Dr. Ferguson is author or co-author of about 30 articles dealing chiefly with hematology, immunogenetics, brucellosis, and leptospirosis.

He has served on the AVMA Research Council since 1947 and as chairman from 1952 to 1955.

New York

New York City Association.—The Veterinary Medical Association of New York City, Inc., met at the New York Academy of Sciences on April 4 to hear Dr. Ellis P. Leonard, New York State Veterinary College, discuss "Treatment of the Damaged Intervertebral Disc—A New Approach," with illustrations.

s/C. E. DECAMP, *Secretary.*

Manitoba

Provincial Association.—The sixty-sixth annual meeting of the Veterinary Association of Manitoba was held March 5-6, 1956, at the Assiniboine Hotel in Winnipeg.

Some of the outstanding speakers, and their subjects, on the scientific program were: M. K. Jarvis, Corn States Laboratories, Omaha, Neb. (swine erysipelas; and diseases of dogs and cats); R. J. Kirk, Experimental Fur Farm, University of Manitoba (diseases of furbearing animals); W. Oliver, Swan River (malignant

head catarrh); K. Warren, Killarney (algae poisoning); C. K. Roe, Ontario Veterinary College, Guelph (mucosal disease of cattle); E. E. Ballantyne, director, veterinary services branch, Edmonton, Alta. (disease problems in Alberta); and R. J. McClenaghan, chief veterinarian, Health of Animals Division, Department of Agriculture, Ottawa (rabies control).

At the business session, the following officers were elected: J. W. Higginson, Boissevain, president; W. G. Jones, Winnipeg, vice-president; and E. J. Rigby, Winnipeg, secretary-treasurer. The following were elected to the board: E. Clark, Morden; J. M. Isa, Winnipeg; G. A. Lawson, Shoal Lake; and C. M. Fraser, Minnedosa. It was decided to revise the practice act and to set up a committee on public relations.

s/E. J. RIGBY, *Resident Secretary.*

VETERINARY MILITARY SERVICE

Colonel Hale Assigned to Walter Reed.—Colonel Maurice W. Hale (UP '28) has been named director of the Division of Veterinary Medicine at the Walter Reed Army Institute of Research, Washington, D. C.

Prior to this appointment, Col. Hale was in charge of all U. S. Army veterinary activities in Europe with headquarters in Heidelberg, Germany, for three years. He also has served in Peru, Canada, and Puerto Rico.

Colonel Maurice W. Hale

Colonel Hale is a member of the AVMA, American Association for the Advancement of Science, Alpha Psi and Phi Zeta fraternities, and has written numerous technical papers in the field of veterinary medicine.

He succeeds Col. Chester A. Gleiser who, until his assignment to Germany in July, will continue in the veterinary division as deputy director.

STATE BOARD EXAMINATIONS

Wyoming—The Wyoming State Board of Veterinary Examiners will conduct an examination on June 13-14, 1956, in Room 304 of the Capitol Building in Cheyenne. Applicants must be present at 9:00 a.m. on the first day. Applications may be obtained from Dr. G. H. Good, secretary, *ex officio,* 304 Capitol Bldg., Cheyenne, Wyo., and must be filed with the secretary by May 30, 1956.

Colorado—The Colorado State Board of Veterinary Medicine announces that examinations will be held June 4-5, 1956, at the veterinary hospital, Colorado A. & M. College, Fort Collins, beginning at 8:00 a.m. on June 4. An affidavit, available from the secretary of the board, must be returned by May 15. Requests for affidavits and further information should be addressed to: V. D. Stauffer, secretary, State Board of Veterinary Medicine, Arvada, Colo.

DEATHS

★**Theodore W. Alt** (KSC '46), 46, Denver, Colo., died Dec. 21, 1956. Dr. Alt had practiced in New Mexico but was forced to discontinue due to ill health. He is survived by his widow.

L. H. Becker (CVC '12), 67, Maquoketa, Iowa, died Feb. 10, 1956. Dr. Becker had practiced in Maquoketa for 15 years. He is survived by his widow, two daughters, and one son, Leo Becker (ISC '43), also of Maquoketa.

★**Charles R. Donham** (ISC '21), 57, Lafayette, Ind., former editor ad interim of AVMA publications, died April 24, 1956. An obituary will appear in a later issue of the JOURNAL.

★**John Huebschmann** (CVC '07), 78, Baltimore, Md., died March 12, 1956. Dr. Huebschman had served for many years with the U. S. BAI. He was a member of the National Association of Federal Veterinarians and was made a life member of the AVMA in 1954.

William H. Mahon (ONT '05), 71, Pittsfield, Mass., died Feb. 6, 1956. Dr. Mahon, a veteran of World War I, had served as inspector of foods and slaughtering in Pittsfield from 1921 until his retirement in 1952. His widow and a daughter survive. Dr. Mahon had been a member of the AVMA.

George L. Schneider (ONT '02), 81, Canton, Ohio, died Feb. 6, 1956. Dr. Schneider had practiced in Canton for 54 years. He is survived by three sons, one of which, Dale E. Schneider (OSU '50) was in practice with him; a daughter; and five grandchildren.

★Indicates members of the AVMA.

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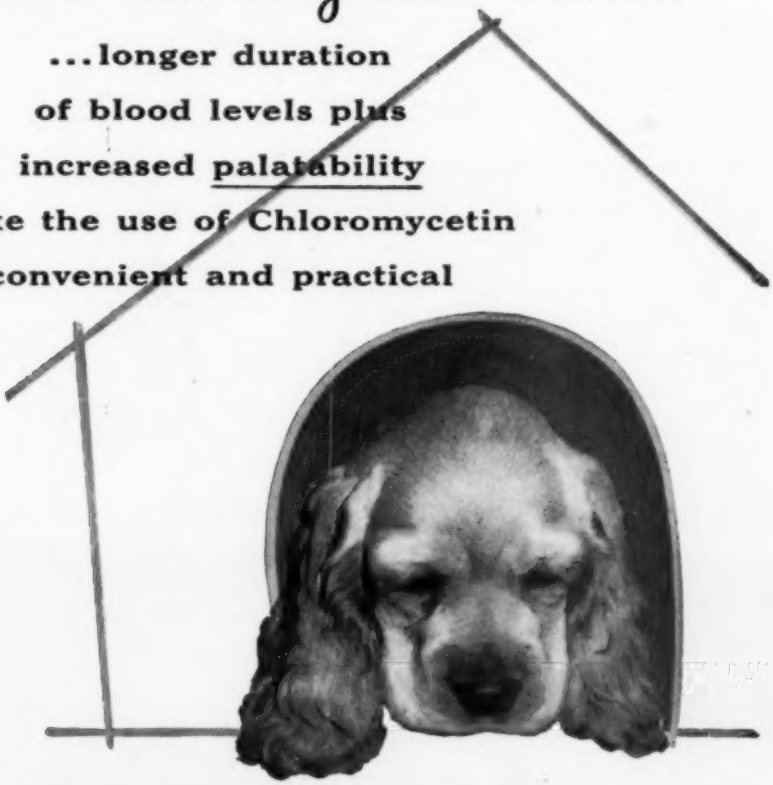

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PROFESSIONAL LITERATURE AVAILABLE ON REQUEST

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ORGANIZATION SECTION

Ninety-Third Annual AVMA Convention San Antonio—October 15-18

Special Tour Plans Completed

Postconvention Trip to Mexico Attracting Much Interest

Members of the AVMA, their wives, and others who will attend the convention in San Antonio next October will be interested to know that tour plans are progressing under the auspices of Happiness Tours, Inc., Chicago, who will again handle arrangements for the Association.

An illustrated folder about the travel and tour plans is to be mailed late in May to AVMA members. Other interested veterinarians and their wives are invited to join the tour and may obtain a folder by writing to the Association's headquarters in Chicago.

Travel to San Antonio via St. Louis, Dallas, Houston, Corpus Christi, King Ranch

St. Louis will be the gathering point for those going by train from various parts of the country. A special train will be operated from St. Louis so that tour members may travel together for the greater portion of the trip and take advantage of one of the most interesting features, a visit to far-famed King Ranch, Kingsville, Texas. A special program is being arranged at the Ranch and will be announced in a later issue of the JOURNAL.

The proposed schedule of the "AVMA Special" from St. Louis calls for departure at 5:40 p.m., October 11, via Dallas, arriving in Houston about 2 p.m., October 12. An interesting day of sightseeing and other features is being arranged in Houston with the "Special" leaving after midnight for Corpus Christi.

Arriving at Corpus Christi on Saturday morning, October 13, the tour party will be met by buses for a short ride to King Ranch for the special program. Later in the day, the group will have dinner at the Robert Driscoll Hotel and will leave Corpus Christi that night, arriving in San Antonio early Sunday morning, October 14, where sleeping cars may be occupied until 7:30 a.m.

After being transferred to their respective hotels, tour members will have opportunity to get settled in ample time for early convention regis-

(Continued on p. 20)

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(SAN ANTONIO CONVENTION—*continued from p. 18*)

tration at the Municipal Auditorium beginning shortly after noon on Sunday.

Travel from Various Points to St. Louis

The "AVMA Special" has been so scheduled out of St. Louis that connections can be made from Boston, New York, Philadelphia, Baltimore, Washington, Louisville, Cincinnati, Pittsburgh, Buffalo, Detroit, upper Michigan and Wisconsin, and certain intermediate points. Tour members from such places as Denver, Portland, Seattle, the Twin Cities, and San Francisco will pick up the special train en route, either at Dallas or Houston. Those from the southeastern states and from Los Angeles and San Diego will make convenient connections at Houston.

Arrangements are also being made so that tour members who are so inclined may travel to the San Antonio convention on the special train and return home by air.

Special Tour Brochure

The brochure outlining the preconvention trip, details about the special train and the visit to King Ranch, also two very attractive postconvention tours to Mexico City, will be printed and mailed about May 15 as stated before. With the brochure will be included complete details about reservations and other information.

One of the old churches in Taxco, overlooking the interesting old town built on the mountainsides.

Two Postconvention Trips to Mexico City Offered

Choice of a 7-day and 10-day trip will be given. Leaving San Antonio following the convention, travel will be by air, either on the afternoon of Thursday, October 18, or Friday, October 19. These trips will feature transportation, *round trip*, between San Antonio and Mexico City and may then be continued from San Antonio to the home cities of tour members.

TOUR 1—ITINERARY

Friday, October 19.—Arrive in Mexico City in early evening and transfer to the Del Prado Hotel.

Saturday, October 20.—A comprehensive tour of Mexico City to view the National Palace, residential area, Zocalo, Chapultepec Park and Castle. Arrive about noon at the fabulous University City where the "Adjourned Session" of the AVMA convention will be held at the fine, ultramodern School of Veterinary Medicine of the National Autonomous University of Mexico. An inspection tour of the School will also be made. Return to the Del Prado Hotel in the afternoon for reception and cocktail party.

Sunday, October 21.—Visit the Palace of Fine Arts to see the famous Tiffany Glass Curtain and continue on to Xochimilco for a leisurely trip by native boat on the winding and picturesque canals.

Attend the exciting bullfights at 4 p.m. and witness a most spectacular and long-to-be-remembered event.

Monday, October 22.—Visit several cattle ranches around Mexico City and attend a special luncheon.

Tuesday, October 23.—Motor to Taxco via Cuernavaca, visiting the Palace of Cortez, Borda Gardens, cathedral, and residential section. Arrive in Taxco for lunch with overnight at Ranch Telva.

There will be time to visit the many quaint shops along the cobblestone streets and purchase silver for which Taxco is famous.

Wednesday, October 24.—Return to Mexico City via Hacienda Vista Hermosa for lunch. Transfer to the airport for departure after midnight.

Thursday, October 25.—Early morning departure by air for the United States.

TOUR 2—ITINERARY

Friday, October 19.—Same as Tour 1.

Saturday, October 20.—Same as Tour 1.

Sunday, October 21.—Same as Tour 1.

Monday, October 22.—Same as Tour 1.

Tuesday, October 23.—Same as Tour 1.

Wednesday, October 24.—Instead of returning to

(*Continued on p. 22*)

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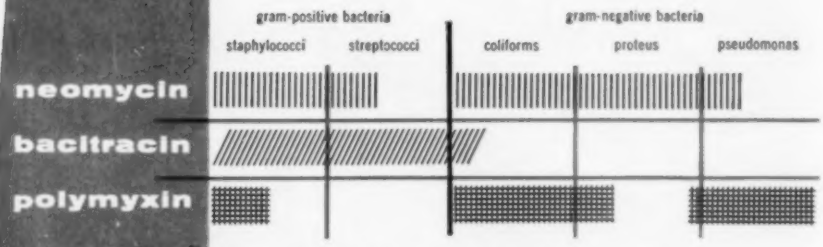

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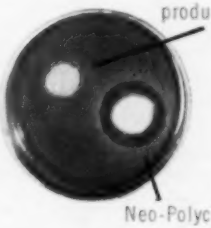

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The floating gardens at Xochimilco, Mexico.

(SAN ANTONIO CONVENTION—*continued from p. 20*)

Mexico City, continue on to Acapulco by motor arriving in time for lunch.

Thursday, October 25, and Friday, October 26.—In Acapulco for independent action—fishing, swimming, sun bathing, and relaxing.

Saturday, October 27.—Leave Acapulco and return via Vista Hermosa to Mexico City and transfer to the airport for departure after midnight.

Sunday, October 28.—Early morning departure by air for the United States.

The complete facilities of Happiness Tours will be at the disposal of the tour members in arranging their travel plans from and to the Convention whether by way of the special train or individually by rail or air. Taking advantage of this expert service will facilitate and assure a comfortable trip to the Convention.

Earlier return to the States can be arranged for those who can take only the first 4 days of the tours as outlined.

From advance inquiries, we know that the post-convention trip to Mexico will be of great interest. If anyone desires advance information, a letter addressed to Mr. J. Stuart Rotchford, president, Happiness Tours, Inc., 6 East Monroe St., Chicago 3, Ill., will get his personal attention.

Additional information, including rail schedules from various parts of the country and by various railroads, will appear in subsequent issues of the JOURNAL.

WOMEN'S AUXILIARY

President—Mrs. Earl N. Moore, 636 Beall Ave., Wooster, Ohio.

Secretary—Mrs. F. R. Booth, 3920 E. Jackson Blvd., Elkhart, Ind.

Highlights of Student Auxiliary Days.—The veterinarian's wife of yesterday did not have the opportunities and the advantages of today. It has been said by many older wives that they wished they could go back to school again.

The life of a student has changed the past several years. Today, the student auxiliary is a helpful influence for the wife of a veterinary student. The wives have a social life which they plan with underclassmen. Each class of wives contributes its talent and, usually, a variety of programs is enjoyed throughout the year.

During the last semester of school, the senior wives have special classes. This is to help them in preparing to assist their husbands. A number of fine courses are offered. A few of these courses are: public relations, office techniques, preparation, sterilization and care of instruments, administering anesthetics and preparation of small animals for surgery, obstetrics, and gynecology. Movies are used to illustrate and explain many of these lectures, such as emergency and first aid, ethics, and laws in veterinary medicine.

In the classes, suggestions are given regarding hobbies, preparation of foods and nutrition, as well as social training to assist them in the future. So you can realize all the students have a very busy life. After leaving school with their husbands, their interests will help them to meet varied experiences in different localities.

S/MRS. LEWIS H. MOE, *First Vice-President, Women's Auxiliary to the AVMA.*

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COMING MEETINGS

American Animal Hospital Association. Annual meeting. Hotel Fontainebleu, Miami Beach, Fla., May 23-26, 1956. W. H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.

Eastern Illinois Veterinary Medical Association. All-day clinic. Large Animal Clinic Building, University of Illinois, Urbana, May 24, 1956. H. S. Bryan, College of Veterinary Medicine, University of Illinois, secretary.

Kansas State College. Conference for veterinarians. New veterinary hospital, Kansas State College, Manhattan, June 1-2, 1956. E. E. Leasure, dean.

Wyoming Veterinary Medical Association. Summer meeting. Pinedale, Wyo., June 10-11, 1956. J. J. Ryff, P.O. Box 960, Laramie, secretary.

California State Veterinary Medical Association. Annual meeting. Hotel Statler, Los Angeles, June 10-13, 1956. Charles S. Travers, 3004 16th St., San Francisco, executive secretary.

Georgia Veterinary Medical Association. Fiftieth anniversary meeting. Hotel Oglethorpe, Savannah, June 10-12, 1956. C. C. Rife, 505 Lindberg Dr., N.E., Atlanta 5, secretary.

Ohio State University. Conference for veterinarians. Union Building, Ohio State University, Columbus, June 13-14, 1956. John H. Helwig, chairman.

Montana Veterinary Medical Association. Summer meeting. Livingston, Mont., June 13-15, 1956. G. A. Morrison, 916 Central Ave., Great Falls, secretary.

Idaho Veterinary Medical Association. Summer meeting. Salmon, Idaho, June 18-20, 1956. A. P. Schneider, 3025 N. Twenty-Third St., Boise, secretary.

Michigan State Veterinary Medical Association. Annual meeting. Bancroft Hotel, Saginaw, June 21-22, 1956. Paul V. Howard, 4011 Hungsberger, N.E., Grand Rapids, secretary.

Vermont Veterinary Medical Association. Annual summer conference. The Lodge at Smuggler's Notch, Stowe, June 21-22, 1956. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Utah Veterinary Medical Association. Annual meeting. Auditorium of the Provo Power Utilities Bldg., Provo, June 21-22, 1956. B. N. Horstman, 3685 Riverdale Rd., Ogden, secretary.

Alberta Veterinary Association. Annual meeting. Edmonton, Alta., June 22-23, 1956. C. H. Bigland, 10988 Seventy-Fourth Ave., Edmonton, chairman, convention committee.

North Dakota Veterinary Medical Association. Annual meeting. Jamestown, N. Dak., June 25-26, 1956. Dean Flagg, 202 Teton Ave., Bismarck, secretary.

North Carolina Veterinary Medical Association. Annual meeting. Greensboro, N. Car., June 25-27, 1956. Martin P. Hines, Raleigh, executive committee.

University of Wisconsin. Annual veterinary conference. University of Wisconsin, Madison, June 26-27, 1956 C. H. Brandly, head, Department of Veterinary Science.

Maritime Veterinary Associations. Annual joint conference. Mount Allison University, Sackville, N. B., June 26-28, 1956. J. F. Frank, P.O. Box 310, Sackville, chairman.

Wisconsin, University of. Postgraduate conference for veterinarians. University of Wisconsin, Madison, June 27-28, 1956. C. A. Brandly, head, Department of Veterinary Science.

Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1956. John D. Gadd, Cockeysville, Md., secretary.

Pacific Northwest Veterinary Medical Association (British Columbia, Oregon, Washington). Annual meeting. Vancouver, B. C., June 28-30, 1956. P. L. Stovell, 3187 W. Forty-Third Ave., Vancouver, coordinator.

South Carolina Association of Veterinarians. Summer meeting. Clemson House, Clemson College, S. Car., June 28-30, 1956. B. C. McLean, P. O. Box 432, Aiken, program chairman.

Mississippi State Veterinary Association. Annual meeting. Buena Vista Hotel, Biloxi, July 15-17, 1956. Harvey F. McCrory, P.O. Box 536, State College, secretary.

Iowa State College. Annual conference for veterinarians. Memorial Union, Iowa State College, Ames, July 17-18, 1956. John B. Herrick, Iowa State College, Ames, co-chairman of conference.

Virginia Veterinary Medical Association. Summer meeting. Natural Bridge Hotel, Natural Bridge, July 17-19, 1956. Wilson B. Bell, 1303 Hillcrest Dr., Blacksburg, secretary.

Canadian Veterinary Association and the College of Veterinary Medicine of the Province of Quebec. Annual joint congress. Sheraton-Mont Royal Hotel, Montreal, July 19-21, 1956. Jacques St. Georges, publicity committee.

Alabama Polytechnic Institute. Annual conference for veterinarians. School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., July 22-25, 1956. R. S. Sugg, dean.

Colorado Veterinary Medical Association. Annual meeting. Estes Park, Sept. 7-9, 1956. G. H. Gilbert, 5500 Wadsworth Blvd. Arvada, Colo., secretary.

Pennsylvania State Veterinary Medical Association. Annual meeting. Bedford Springs Hotel, Bedford, Pa., Sept. 12-14, 1956. Raymond C. Snyder, N.W. Corner Walnut St., and Copley Rd., Upper Darby, Pa., secretary.

New York State Veterinary Medical Society, Annual meeting. Concord Hotel, Kiamesha Lake, N. Y., Sept. 19-21, 1956. L. W. Goodman, 2303 Northern Blvd., Manhasset, general chairman; Miss Joan S. Halat, 803 Varick St., Utica, secretary.

Washington State Veterinary Medical Association. Annual meeting. Davenport Hotel, Spokane, Sept. 21-22, 1956. P. J. Pfarr, 6306 N. Wall St., Spokane 53, general chairman.

Oklahoma conference for veterinarians. School of Veterinary Medicine, Oklahoma A. & M. College, Stillwater, Sept. 27-28, 1956. A. L. Malle, Department of Veterinary Pathology, chairman.

Eastern Iowa Veterinary Association, Inc. Annual meeting. Hotel Montrose, Cedar Rapids, Oct. 4-5, 1956. Forrest E. Brutsman, Traer, secretary.

(Continued on p. 28)

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Furacin 0.2% dissolved in a water-soluble base.

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This unique class of antimicrobials, first synthesized by Eaton Laboratories, is bactericidal and permits little development of resistance; has low toxicity to tissue; does not inhibit phagocytosis or healing; is effective in the presence of pus, blood, milk or serum.

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FOR BOVINE MASTITIS, SPRAYING OR WET DRESSINGS

A water-miscible liquid of Furacin 0.2% in polyethylene glycol and water.

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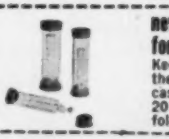

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(COMING MEETINGS—*continued from p. 24*)

American Veterinary Medical Association. Annual meeting. Municipal Auditorium, San Antonio, Texas, Oct. 15-18, 1956. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

U. S. Livestock Sanitary Association. Annual meeting. Morrison Hotel, Chicago, Ill., Nov. 28-30, 1956. R. A. Hendershott, 33 Oak Lane, Trenton 8, N. J., secretary.

Nebraska Veterinary Medical Association. Annual meeting. Hotel Lincoln, Lincoln, Dec. 3-5, 1956. W. T. Spencer, 1250 North 37th St., Lincoln, secretary.

Foreign Meetings

World Congress on Fertility and Sterility. Naples, Italy, May 18-26, 1956. Professor T. Bonadonna, Via Monte Ortigara, 35, Milan, Italy, in charge of Veterinary Section.

Third International Congress on Animal Reproduction. Arts School, Cambridge University, Cambridge, England, June 25-30, 1956. Dr. Joseph Edwards, Milk Marketing Board, Thames Ditton, Surrey, England, honorary secretary.

Veterinary Conference, Jamaica Branch, British Caribbean Veterinary Association, Jamaica, B.W.I., July 28-Aug. 8, 1956. C. L. Bent, Veterinary Division, Department of Agriculture, Hope, Kingston, Jamaica, B.W.I. honorary secretary.

Tenth International Congress of Entomology. McGill University and University of Montreal, Montreal, Canada, Aug. 17-25, 1956. J. A. Downes, Division of Entomology, Science Service Bldg., Ottawa, Ont., Canada, secretary.

International Association of Hydatidology. Sixth Congress. Athens, Greece, Sept. 14-18, 1956. Prof. B. Kourias, 1 MacKenzie King St., Athens, Greece, general secretary.

(*Continued on p. 30*)

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Regularly Scheduled Meetings

ALABAMA—Central Alabama Veterinary Association, the first Thursday of each month. B. M. Lauderdale, Montgomery, secretary.

Jefferson County Veterinary Medical Association, the second Thursday of each month. W. R. Laster, Jr., 213 N. 15th St., Birmingham, Ala., secretary.

ARIZONA—Central Arizona Veterinary Medical Association, the second Tuesday of each month. Keith T. Maddy, Phoenix, Ariz., secretary.

Pima County Veterinary Medical Association, the third Wednesday of each month in Tucson. E. T. Anderson, 8420 Tanque Verde Rd., Tucson, Ariz., secretary.

Southern Arizona Veterinary Medical Association, the third Wednesday of each month at 7:30 p.m. E. T. Anderson, Rt. 2, Box 697, Tucson, Ariz., secretary.

CALIFORNIA—Bay Counties Veterinary Medical Association, the second Tuesday of each month. E. Paul, Redwood City, Calif., secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Wilfred Pimentel, 3455 S. Elm Ave., Fresno, Calif., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. Leo Goldston, 3793 Broadway, Oakland 11, Calif., secretary.

Kern County Veterinary Medical Association, the first Thursday evening of each month. B. C. Watson, 825 14th St., Bakersfield, Calif., secretary.

Mid-Coast Veterinary Medical Association, the first Thursday of every even month. W. H. Rockey, P. O. Box 121, San Luis Obispo, Calif., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. Lewis J. Campbell, 90 Corral de Tierra, Salinas, Calif., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month at the Hotel Covell, in Modesto, Calif. Lyle A. Baker, Turlock, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. Chester A. Maeda, 766 E. Highland Ave., San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, the third Thursday of each month. Donald E. Lind, 2643 N. Main St., Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. T. D. Harris, San Mateo, Calif., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. Robert E. Clark, Napa, Calif., secretary.

Sacramento Valley Veterinary Medical Association, the second Wednesday of each month. W. E. Steinmetz, 4227 Freeport Blvd., Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. H. R. Rossoll, 1795 Moore St., San Diego, Calif., secretary.

San Fernando Valley Veterinary Medical Association, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. Howard C. Taylor, 2811 West Olive St., Burbank, Calif., secretary.

Tulare County Veterinarians, the second Thursday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

COLORADO—Denver Area Veterinary Society, the fourth Tuesday of every month. Richard C. Tolley, 5060 S. Broadway St., Englewood, Colo., secretary.

Northern Colorado Veterinary Medical Society, the first Monday of each month. M. A. Hammarlund, School of

(*Continued on p. 32*)

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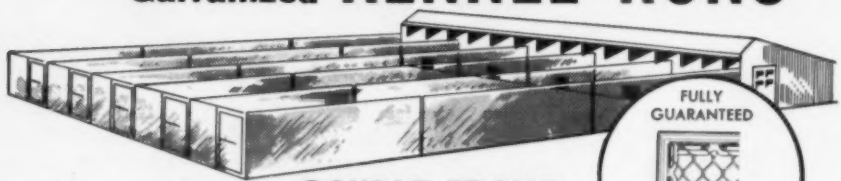

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*T.M.

Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.

DELAWARE—New Castle County Veterinary Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. E. J. Hathaway, Clifton Park Manor, Apt. 73-5, Wilmington 2, Del., secretary.

FLORIDA—Jacksonville Veterinary Medical Association, the second Thursday of each month, time and place specified monthly. George F. Yopp, 4644 Main St., Jacksonville, Fla., Secretary.

Palm Beach Veterinary Society, the last Thursday of each month in the county office building at 810 Datura St., West Palm Beach. Ross E. Evans, 5215 S. Dixie Highway, West Palm Beach, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. Paul J. Myers, Winter Haven, Fla., secretary.

South Florida Veterinary Society, the third Tuesday of each month, at the Seven Seas Restaurant, Miami, Fla. E. D. Stoddard, 6432 S. W. 8th St., Miami, Fla., secretary.

GEORGIA—Atlanta Veterinary Society, the second Tuesday of every month at the Elks Home on Peachtree St., Atlanta, Ga. J. L. Christopher, Smyrna, Ga., secretary.

ILLINOIS—Chicago Veterinary Medical Association, the second Tuesday of each month. Mark E. Davenport, Jr., 215 S. Edgewood Ave., LaGrange, Ill., secretary.

Eastern Illinois Veterinary Medical Association, the first Thursday of March, June, September, and December. A one-day clinic is held in May. H. S. Bryan, College of Veterinary Medicine, University of Illinois, Urbana, secretary.

INDIANA—Central Indiana Veterinary Medical Association, the second Wednesday of each month. Peter Johnson, Jr., 4410 N. Keystone Ave., Indianapolis 5, secretary.

Michiana Veterinary Medical Association, the second Thursday of every month, except July and December, at the Hotel LaSalle, South Bend, Ind. J. M. Carter, 3421 S. Main St., Elkhart, Ind., secretary.

Tenth District Veterinary Medical Association the third Thursday of each month. W. E. Sharp, Union City, Ind., secretary.

IOWA—Cedar Valley Veterinary Association, the second Monday of each month, except January, July, August, and October, at Black's Tea Room, Waterloo, Iowa. D. A. Buchanan, Grundy Center, Iowa, secretary.

Coon Valley Veterinary Association, the second Wednesday of each month, September through May, at the Bradford Hotel, Storm Lake, Iowa. D. I. Lee, Sac City, Iowa, secretary.

Fayette County Veterinary Association, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Winneslick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

KENTUCKY—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. L. S. Shirrell, Versailles Rd., Frankfort, secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month in Louisville or within a radius of 50 miles. W. E. Bewley, P.O. Box "H," Crestwood, secretary.

MARYLAND—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m. at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Harry L. Schultz, Jr., 9011 Harford Rd., Baltimore, Md., secretary.

MICHIGAN—Mid-State Veterinary Medical Association,

(*Continued on p. 33*)

Jen-Sal

small animal
therapy note

small animal formula Insti-lysin

Insti-lysin's dramatic proteolytic enzyme action is now available to the small animal practitioner in exclusive formula and packaging. Enzyme stimulation plus effective antibacterial coverage make Insti-lysin ideal therapy for resistant otitis externa, following ear trims or for chronic skin lesions. Packaged in disposable plastic syringes for easy application and dispensing.

cartons of twelve 5 cc. disposable syringes; 250 cc. bulk vials

Jensen-Salsbery Laboratories, Inc.
Kansas City, Missouri

the fourth Thursday of each month with the exception of November and December. Robert E. Kader, 5034 Armstrong Rd., Lansing 17, Mich., secretary.

Saginaw Valley Veterinary Medical Association, the last Wednesday of each month. S. Correll, Rt. 1, Midland, Mich., secretary.

Southeastern Veterinary Medical Association, the fourth Wednesday of every month, September through May. Gilbert Meyer, 14003 E. Seven Mile Rd., Detroit 5, Mich., secretary.

MISSOURI—Greater St. Louis Veterinary Medical Association, the first Friday of the month (except July and August) at the Sheraton Hotel, Spring Ave. and Lindell Blvd. Allen B. Shopmaker, 136 N. Meramec, Clayton 5, Mo., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at alternating hospitals. W. F. Noland, 7504 Metcalf, Overland Park, Kan., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month at Exchange Hall, ninth floor, Livestock Exchange Bldg., 1600 Genessee St., Kansas City, Mo. Busch Meredith, 800 Woodswether Rd., Kansas City 5, Mo., secretary.

NEW JERSEY—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Highstown, N. J. David C. Tudor, Cranbury, N. J., secretary.

Metropolitan New Jersey Veterinary Medical Association, the third Wednesday evening of each month from October through April at the Academy of Medicine, 91 Lincoln Park South, Newark, N. J. Myron S. Arlein, 2172 Milburn Ave., Maplewood, N. J., secretary.

Northern New Jersey Veterinary Association, the fourth Tuesday of each month at the Casa Mana in Teaneck. James R. Tanzola, Upper Saddle River, secretary.

Southern New Jersey Veterinary Medical Association, the third Tuesday of each month at the Collingswood Veterinary Hospital, Collingswood. W. E. Snyder, E. Kings Highway and Munn Ave., Haddonfield, secretary.

NEW YORK—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

Monroe County Veterinary Medical Association, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

NORTH CAROLINA—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel in Greensboro. J. W. Peace, High Point, secretary.

Eastern North Carolina Veterinary Medical Association, the first Friday of each month. Wm. Allen Potts, 401 W. James St., Mount Olive, secretary.

Piedmont Veterinary Medical Association, the last Friday of each month at 7:00 p.m. in Mull's Motel in Hickory, N. Car. W. W. Dickson, Box 1071, Gastonia, N. Car., secretary.

OHIO—Cuyahoga County Veterinary Medical Association, the first Wednesday of each month, September through May (except January), at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. Ed. R. Jacobs, 5522 Pearl Rd., Cleveland, Ohio, secretary.

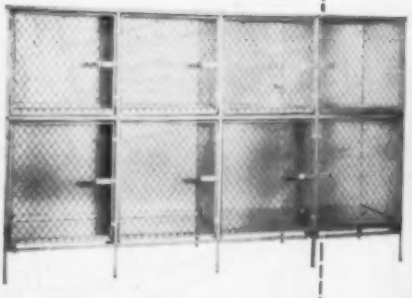
OKLAHOMA—Oklahoma County Veterinary Medical Association, the second Wednesday of every month except July and August. James M. Brown, 2818 W. Britton Rd., Oklahoma City, secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month in Directors' Parlor of the Brookside State Bank, Tulsa, Okla. Merle S. Watts, 5302 E. 11th St., Tulsa, Okla., secretary.

(*Continued on p. 36*)

Jen-Sal's all-metal 8 cage unit, $265

Whether you're dressing up an old cage ward or installing a new one, you should consider Jen-Sal's handsome aluminum-finished all-metal units. Prices as low as $33 each. The unit shown costs $265 for 8 cages. It's 9 feet 8 inches long; 6 feet 1 inch high; and 2 feet 5 inches deep. See our catalog page 262.



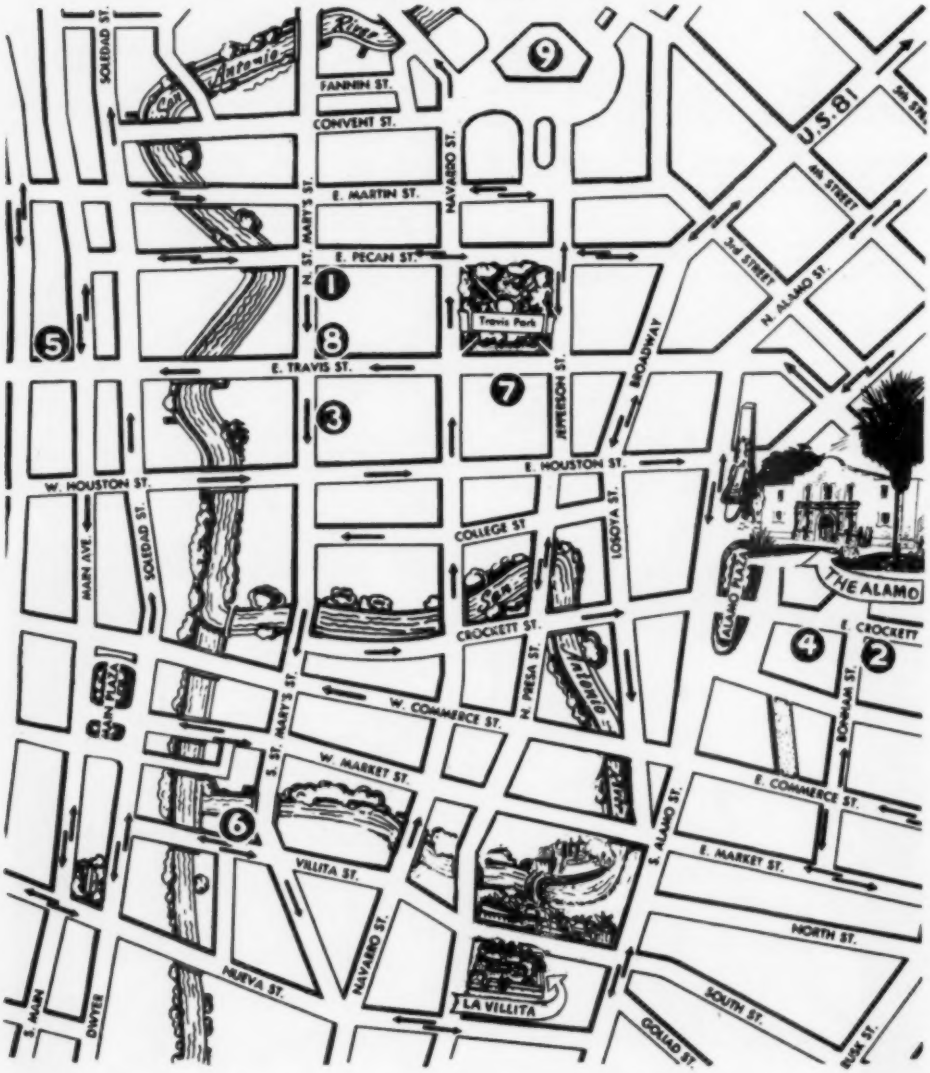
JSA-53K-81, metal cage, $265 f. o. b.

Jen-Sal

Jensen-Salsbery Laboratories, Inc.
Kansas City, Missouri
advanced instrument designs for advanced veterinary surgery

Hotel Map of San Antonio

The general sessions and larger section meetings will be held at the Municipal Auditorium (No. 9). The smaller section meetings will be held at the Gunter Hotel (No. 3).



1. Blue Bonnet Hotel
2. Crockett Hotel
3. Gunter Hotel
4. Menger Hotel
5. Robert E. Lee Hotel
6. Plaza Hotel
7. St. Anthony Hotel
8. White Plaza Hotel
9. Auditorium

Motel Information—Motels listed on the reservation form are located on Austin Highway, U.S. 81, which enters San Antonio via Broadway. Rio Lado Motel is at 1100 N. St. Mary's St., near the business section.

HOTEL RESERVATIONS — SAN ANTONIO CONVENTION

Ninety-Third Annual AVMA Meeting, Oct. 15-18, 1956

All requests for hotel accommodations will be handled by a Housing Bureau in cooperation with the Committee on Local Arrangements. The Bureau will clear all requests and confirm reservations.

Hotels—Motels and Rates (all are air-conditioned)

HOTEL	SINGLE	DOUBLE	TWIN BEDS
1. Blue Bonnet	$3.00-5.00	$5.00-8.00	$.....
2. Crockett	$3.50-4.50	$5.50-6.50	.....
3. Gunter	$5.00 and up	$6.50 and up	.....
4. Menger	$5.00-8.00	$7.00-12.00	.....
5. Robert E. Lee	$3.50-5.00	$5.00-6.00	$6.00-8.00
6. St. Anthony	$5.00 and up	$7.00 and up	.....
7. White Plaza	$3.25 and up	$4.75 and up	.....

MOTEL	RATES
1. Aero	$7.50-9.00
2. Aloha	$6.00 and up
3. Belvedere	$6.00-10.00
4. Casa Linda	$6.00 and up
5. Coronado	$5.00 and up
6. Park	$4.00-15.00
7. Rio Lado	$6.00-10.00
8. The Westerner	$5.00 and up
9. Flamingo	$6.00 and up

Tear Here

RESERVATION FORM — AVMA CONVENTION — SAN ANTONIO

To: HOUSING BUREAU, San Antonio Visitors and Information Department, Chamber of Commerce, Insurance Building, San Antonio 5, Texas.

Please make reservations indicated below:

HOTEL

———Single room(s) at $.....

———Double bed room(s) at $.....

———Twin-bed room(s) at $.....

———Suite (specify type of accommodations wanted)

(Three choices MUST be shown)

First choice hotel _____

Second choice hotel _____

Third choice hotel _____

MOTEL

Indicate type of accommodations

(_____)
Unit, Cabin,

wanted for _____ persons at $_____
No. rate

(Three choices MUST be shown)

First choice motel _____

Second choice motel _____

Third choice motel _____

Arriving on (date) _____ at _____ a.m. _____ p.m.

Leaving on (date) _____ at _____ a.m. _____ p.m.

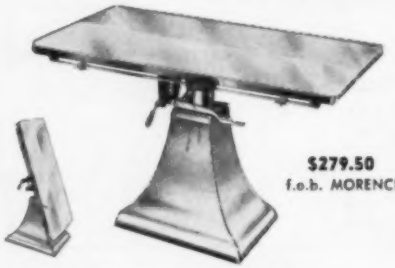
Will be occupied by (attach list of additional names if necessary).

Your Name (Print or Type) _____

Street Address _____ City and State or Province _____

WORLD'S FINEST STAINLESS STEEL OPERATING TABLES

made exclusively for Veterinarians



$279.50
f.o.b. MORENCI

HYDRAULIC OPERATING TABLE

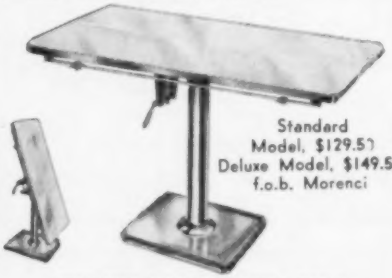
Features precision-made hydraulic unit guaranteed for life of the table. Finger-touch control raises, lowers and locks table in seconds. Large 24" x 60" top. Movable on concealed casters.

STANDARD MODEL **$99.50**

DELUXE MODEL **$129.50**

EXAMINATION TABLE

Reinforced stainless steel top in 22" x 48" size. Six tie clamps. Patented "corner compensators" automatically level table on any surface. Designed for examination and pre-surgery treatment.



Standard Model, $129.50
Deluxe Model, $149.50
f.o.b. Morenci

STAINLESS STEEL OPERATING TABLE

Chrome plated single pedestal and base combined with reinforced stainless steel top. Positive locking adjustment in twelve positions. Super size 24" x 60" top.

ALL MODELS AVAILABLE FROM LEADING SUPPLIERS

TED STOCKWELL MFG. CO.
MORENCI, MICHIGAN

(COMING MEETINGS—*continued from p. 33*)

PENNSYLVANIA—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine, 39th and Woodland Ave., Philadelphia 4, Pa. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., secretary.

SOUTH CAROLINA—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

TEXAS—Coastal Bend Veterinary Association, the second Wednesday of each month. J. Marvin Prewitt, 4141 Lexington Blvd., Corpus Christi, Texas, secretary.

VIRGINIA—Central Virginia Veterinarians' Association, the third Thursday of each month at the William Byrd Hotel in Richmond at 8:00 p.m. M. R. Levy, 312 W. Cary St., Richmond 20, Va., secretary.

Southwest Virginia Veterinary Medical Association, the first Thursday of each month. I. D. Wilson, Blacksburg, secretary.

WASHINGTON—Seattle Veterinary Medical Association, the third Tuesday of each month in the Trinity Episcopal Church, 8th and James St., Seattle, Wash. P. R. Des Rosiers, 5508 2nd Ave., N. W., Seattle 7, Wash., secretary.

South Puget Sound Veterinary Association, the second Thursday of each month except July and August. Jo Walker, Agriculture Experiment Station, Puyallup, Wash., secretary.

WEST VIRGINIA—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the second Thursday of each month in the Hotel Prichard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W., Huntington, W. Va., secretary.

WISCONSIN—Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd. George F. Lynch, 201 West Devon St., Milwaukee 17, Wis., secretary.

KASCO DOG FOOD has high FAT CONTENT

8% FAT...

another

BONUS BENEFIT

you get in

KASCO DOG FOOD

Manufactured by KASCO MILLS, Toledo, Ohio

double-duty combination with proved advantages

COMBIOTIC®

PENICILLIN AND DIHYDROSTREPTOMYCIN

Lowers the cost of combined penicillin-streptomycin therapy.

Enhances effectiveness of each antibiotic.

Gives a broader antimicrobial range of activity.

Provides rapid *antibacterial* action.

Provides effectiveness against some organisms which may be resistant to individual antibiotics.

Produces high blood and tissue concentrations, promptly attained.

Results in minimum development of resistant strains.

Is exceptionally well tolerated in *all* species of animals.

COMBIOTIC P-S (DRY)

Single-dose vials
Five-dose vials

each dose contains: 100,000 units penicillin G potassium, 300,000 units penicillin G procaine and 1.0 gram dihydrostreptomycin.

COMBIOTIC AQUEOUS SUSPENSION

Single-dose vials (2 cc.)
Five-dose vials (10 cc.)
Fifty-dose vials (100 cc.)

each dose contains: 400,000 units penicillin G procaine and 0.5 gram dihydrostreptomycin.

Pfizer Department of Veterinary Medicine

PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N. Y.

FIVE SPECIAL FORMULAE Prescription Diets

FOR DOGS and CATS

EFFECTIVE WHEN NUTRITIONAL THERAPY IS INDICATED

1. p/d for Reproduction and Lactation
2. r/d for Obesity Correction
3. i/d for Intestinal Disorders
4. k/d for Nephritic Conditions
5. c/d Special diets for Cats

DISPENSED ONLY BY GRADUATE VETERINARIANS

WRITE FOR INFORMATION ON THERAPEUTIC FEEDING

A

(Inquiry form for graduate veterinarians only)
HILL PACKING COMPANY, Box 148, Topeka, Kan.
Send information on therapeutic feeding ☐
Send information on other Hill products ☐

NAME _____

ADDRESS _____

HILL PACKING COMPANY
P.O. Box 148 Topeka, Kans.

CLASSIFIED ADVERTISEMENTS

Personal Want Ads—$4.00 for the first 25 words and 10 cents for each additional word; 35 cents for use of box number.

Commercial Want Ads—$5.00 for the first 25 words, 25 cents for each additional word.

Remittance must accompany ad.

Deadlines for Want Ads

For JOURNAL dated 1st of month **— 8th of month preceding date of issue.**

For JOURNAL dated 15th of month **— 22nd of month preceding date of issue.**

Names of classified advertisers using key letters can not be supplied. Address your reply to the key letters, c/o JOURNAL of the AVMA, 600 S. Michigan Ave., Chicago 5, Ill., and it will be transmitted to the advertiser.

Wanted—Veterinarians

Veterinarian wanted with Kansas license in primarily small animal practice; experience with large animals desirable. Salary commensurate with ability and experience. Permanent arrangement possible after one year. Address Dr. John S. Haley, 109 W. 29th St., Topeka, Kan.

Veterinarian with California license wanted to assist in busy small animal practice, West Los Angeles. Good clientele; percentage arrangement. Address Dr. R. W. Sprowl, 11718 Olympic Blvd., Los Angeles 64.

Assistant veterinarian wanted for country practice; 85% large animals. Northern New England. Address "Box K 4," c/o JOURNAL of the AVMA.

Wanted—Positions

Graduate, 1954, desires position in mixed or small animal practice; licensed in Florida, North Carolina, Virginia. Available August on completion of military service. Address "Box K 1," c/o JOURNAL of the AVMA.

Graduate, 1953, desires position with practitioner, mixed practice, with view to partnership or eventual purchase. Prefer Middlewest or West. Married, 27, veteran. Address "Box K 3," c/o JOURNAL of the AVMA.

Recent Cornell graduate desires position in small animal practice; licensed New York, Pennsylvania, Virginia. Being discharged from Army, December, 1956; married. Address "Box K 6," c/o JOURNAL of the AVMA.

(*Continued on p. 39*)

(CLASSIFIED ADS—*continued from p. 38*)

Graduate, 1955, desires permanent position in mixed or small animal practice in Illinois, Indiana, Michigan, or Ohio. Available immediately. Address "Box K 7," c/o JOURNAL of the AVMA.

Veterinarian desires employment with state poultry or meat inspection. Experienced. Address "Box K 8," c/o JOURNAL of the AVMA.

Temporary position wanted in Florida until draft status clear; Florida license. Year's experience with leading Florida practitioner. Small animals preferred. Available immediately. Address "Box K 12," c/o JOURNAL of the AVMA.

Veterinarian being discharged from service in August desires position or will purchase mixed or large animal practice in Middlewest. Address "Box K 13," c/o JOURNAL of the AVMA.

Wanted—Practices

Small animal practice wanted in western New York; must be a going, established practice completely equipped. Substantial down payment. Address "Box E 7," c/o JOURNAL of the AVMA.

Veterinarian with 9 years of experience in large and small animals wishes to lease or buy practice. Will consider position or partnership with veteri-

(*Continued on p. 42*)

More Veterinary Speakers Before Dog Clubs

The Gaines Dog Research Center would like to see more veterinarians make appearances before meetings of dog breeders and dog owners and is offering the services of its Speakers Bureau in bringing this about. Mr. Harry Miller, director of the Center, announces that, as a public service, lists of qualified speakers, together with the subjects they are prepared to present, are maintained at the Center.

Veterinary practitioners, college staff members, research workers, and other veterinarians who feel they have interesting or unusual information to impart to dog clubs and other groups are urged to write immediately for listing with the Speakers Bureau, 250 Park Ave., New York City, giving any special qualifications, topics, and conditions under which they will accept speaking engagements. Thus, the facts may be available to groups seeking talent for their meetings. For bringing group and speaker together, there is no charge. In the case of a speaker requiring a fee or expenses, this will be a subject of direct negotiation between the parties concerned.

Send for FREE 36-page Treatise on
CARROT OIL VITAMINS
Details the advantages of carrot oil vitamins when used in feeds to improve breeding results; to destroy oxidized milk flavors; and to promote general good health and glossy coats. Contains much information. Replete with data and references. Send for it today.
NUTRITIONAL RESEARCH ASSOCIATES
Dept. 251-M. South Whitley, Indiana

yes, I'd welcome samples of both—

IODEX
PLAIN OINTMENT
Indicated primarily for its iodine content—as in swollen glands, boils, minor wounds, skin eruptions, irritations and infections.

IODEX
GUM METHYL SALICYLATE OINTMENT
Indicated for its counter-irritant action—as in lameness, strains, and other painful muscle, tendon and joint involvement.

Both forms of Iodex supplied in tubes of 1 oz. and jars of 1, 4, and 16 oz.

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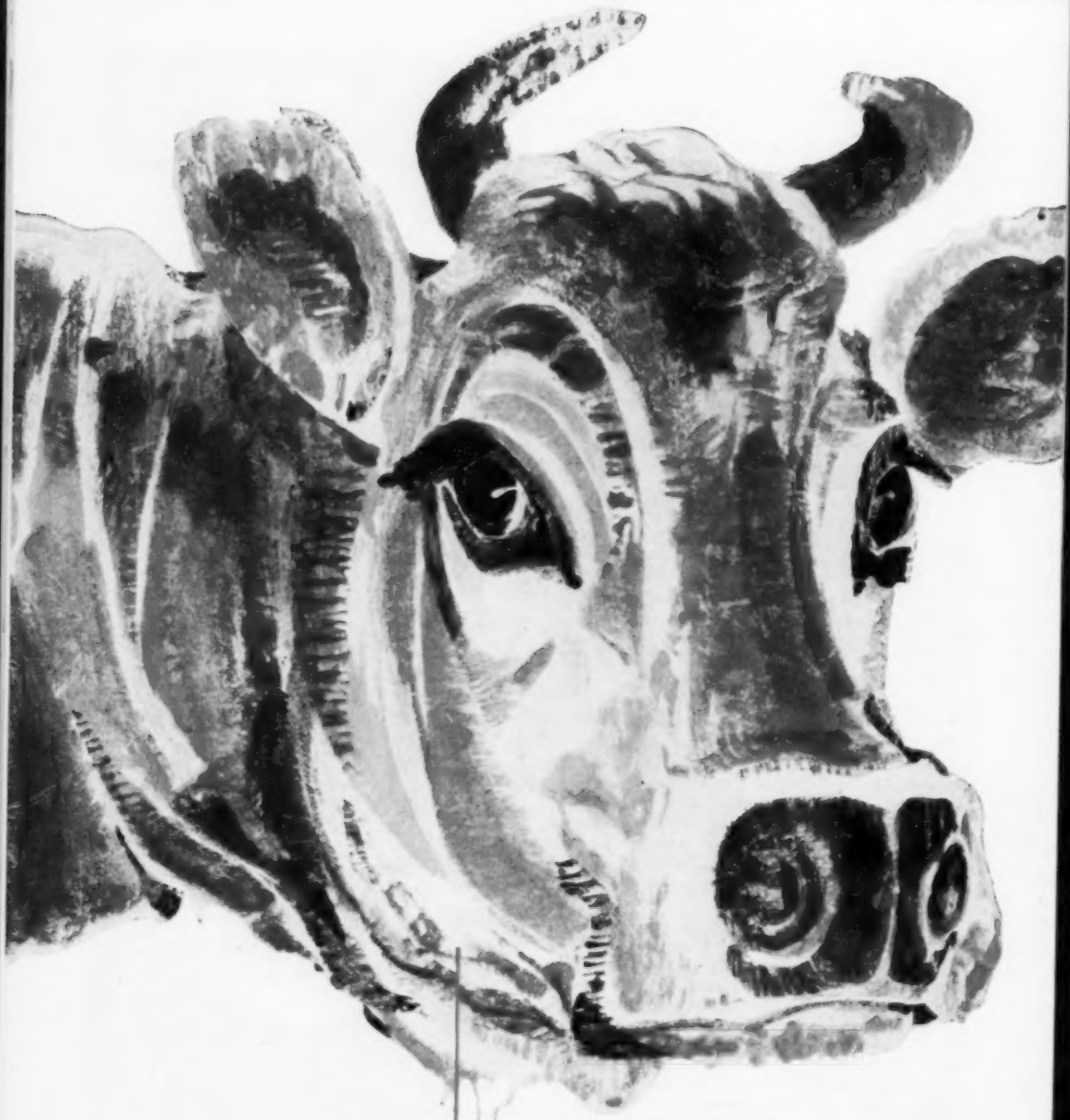

POLYOTIC INTRAMUSCULAR:
100 mg.-500 mg.-1 Gm.-5 Gm.
POLYOTIC INTRAVENOUS: 100 mg.-2.5 Gm.
POLYOTIC OBLETS®: 4's-6 x 4's
POLYOTIC CAPSULES: 50 mg., 25's-100's;
100 mg., 100's; 250 mg., 16's-100's
POLYOTIC TABLETS: 50 mg., 25's-100's;
100 mg., 25's-100's; 250 mg., 16's-100's
POLYOTIC MASTITIS OINTMENT ¼ oz.
POLYOTIC COMPOUND MASTITIS OINTMENT: ¼ oz.
POLYOTIC OPHTHALMIC OINTMENT 1%: 6 x ⅛ oz.
POLYOTIC POWDER 2%: 35 Gm.
POLYOTIC TOPICAL OINTMENT 3%: 1 oz.
POLYOTIC SOLUBLE (Tinted) POWDER:
¼ lb.-½ lb.-1 lb.-5 lb.
AVIANIZED® RABIES VACCINE: (Canine):
1 dose-5 x 1 dose-10 doses-100 doses
AVIANIZED RABIES VACCINE: (Cattle): 10 doses
AVIANIZED CANINE DISTEMPER VACCINE:
1 dose-10 x 1 dose

ANTI-CANINE DISTEMPER SERUM AND ANTI-INFECTIOUS
CANINE HEPATITIS SERUM: 100 cc.
INFECTIOUS CANINE HEPATITIS VACCINE: 2 cc.-10 cc.
BRUCELLA ABORTUS VACCINE: 1 dose-5 x 1 dose-
5 doses (25 cc.)
FELINE DISTEMPER VACCINE: 1 immunization (2 vials
Vaccine, 2 vials Sterile Diluent, 2 cc.)
ANTI-FELINE DISTEMPER SERUM: 10 cc.
CARICIDE® Diethylcarbamazine TABLETS:
400 mg., 25's
DIETHYLSTILBESTROL SOLUTION: 10 cc.-50 cc.
LEPTOSPIRA CANICOLA-ICTEROHEMORRHAGIAE BACTERIN
Whole Culture Inactivated:
1 dose
Other products to be added.

LEDERLE PROFESSIONAL LINE

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The Practicing Veterinarian is the Key man in any Rabies Control Program

1 **AVIANIZED® RABIES VACCINE Modified Live Virus (Chick Embryo Origin)—Vacuum-Dried *Lederle.* For dogs only.**

The control of rabies requires the vaccination of a minimum of 7 out of 10 dogs. In areas where practicing veterinarians have been able to achieve this goal using AVIANIZED Rabies Vaccine there has been a marked reduction in rabies incidence, human deaths and number of antirabic treatments.

2 **AVIANIZED® RABIES VACCINE Modified Live Virus (Chick Embryo Origin)—Vacuum-Dried *Lederle.* For cattle only.**

The problem of rabies in cattle is becoming increasingly important in the United States. The U.S.D.A. has reported 1,931 laboratory-confirmed cases for the years 1952 and 1953. The WHO Expert Committee on Rabies has reported high-egg-passage Lederle-Flury strain Rabies Vaccine for cattle to be antigenic and devoid of pathogenic properties. In field trials during the past 3 years, on over a thousand head, immunity has been demonstrated by challenge (68% survivors vs. 25% in controls).

The practicing veterinarian is more liable to day-to-day rabies exposure than any other professional group.

3 **RABIES VACCINE—Semple Vaccine *Lederle.***

For use by physicians in antirabic (Pasteur) treatment of exposed persons.

4 **Antirabies Serum *Lederle.***

For use by physicians in antirabic treatment of exposed persons as indicated. Now available, cost-free to exposed veterinarians through their local veterinary associations.

AVAILABLE TO VETERINARIANS ONLY

LEDERLE LABORATORIES DIVISION | AMERICAN CYANAMID COMPANY | PEARL RIVER, N. Y.

Eli Lilly Acquires Corn States Laboratories

Corn States Laboratories, Inc., Omaha, Neb., distributors of veterinary products, have announced the acquisition of their company by Eli Lilly and Company, Indianapolis, Ind.

Mr. Forrest Teel, executive vice-president of Eli Lilly and Company, said the acquisition of Corn States Laboratories will give Eli Lilly and Company an established outlet for veterinary products coming from its expanded research and development program. Corn States Laboratories will function as a subsidiary of Eli Lilly and Company. No change is contemplated in the administration, production, sales, and service staffs.

Mr. Teel, in talking to Guy H. Williams, president of Corn States Laboratories, about the purchase said: "Our plan will be to carry on the ethical business in veterinary biologicals so capably developed by Corn States Laboratories and support energetically Corn States Laboratories with both our pharmaceutical and biological research and development staffs—the objective being to supply a line of high-quality pharmaceutical and biological products under the Corn States label for sale to and use by graduate veterinarians."

The Corn States Laboratories, established in 1914, with manufacturing plants in Omaha and Ralston, Neb., distribute a full line of veterinary biological and phamaceutical items. The Company's policy has always been to distribute products only through graduate veterinarians.

(CLASSIFIED ADS—*continued from p. 39*)

narian contemplating retirement in near future. Address "Box K 10," c/o JOURNAL of the AVMA.

For Sale or Lease—Practices

Established veterinary practice, small animal hospital, and boarding kennels for lease in suburban Denver, Colo. For particulars contact the owner, Mrs. Harold F. Newton, Box 233, Adams City, Colo.

For semi-retired veterinarian—beautiful mountain home with office in basement. Permanent population, 5,000; vacationers, 20,000. No competition. Price $18,500; must have $10,000 cash. Box 866, Big Bear Lake, Calif.

Well-established, equipped, profitable practice for sale, mainly small animals, main highway, Bucks County, Pa.; new hospital, 40-cage capacity, separate kennels with individual runs. Large separate house; good will, reasonable; unusual opportunity. Address "Box K 2," c/o JOURNAL of the AVMA.

Wisconsin dairy practice for sale, with or without real estate. Details furnished on request. Address "Box E 12," c/o JOURNAL of the AVMA.

Small animal hospital for sale in metropolitan New York; established over 25 years. Address "Box K 5," c/o JOURNAL of the AVMA.

Excellent, established mixed practice for sale near Indianapolis, Ind.; two-story building with small animal hospital on first floor and 6-room apartment above. Priced at $25,000. Address "Box K 9," c/o JOURNAL of the AVMA.

(*Continued on p. 43*)

SELF FILLING SYRINGE

The multi-injector's third hand

Another accurate smooth working ground glass barrel — leak proof metal plunger instrument with many possibilities. Adjustable for any capacity. By attaching one end of a rubber tube to the self-filling syringe and the other to a bottle of serum or vaccine any number of quick 1/4cc to 5cc accurate dose injections can be made. The instrument is operated with one hand. Anyone who injects a large number of animals will find the Self-Filling Syringe will pay for itself both in labor and serum saved after the first day's use.

Sizes 2cc and 5cc

Literature upon request

Inquire at your nearest veterinary dealer or wholesaler about this new improved outstanding product.

Boston Instrument Mfg. Co. Inc., 50 Thayer Street, Boston 18, Mass.

Dr. Edds Elected Vice President of Fort Dodge

Dr. George T. Edds, formerly director of pharmaceutical research and control, has been elected vice-president in charge of product development of the Fort Dodge Laboratories, Inc. Dr. Edds joined

Dr. G. T. Edds

Fort Dodge in 1950, following 14 years as a member of the staff of Texas A. and M. College, his alma mater. He received his Ph.D in pharmacology from the University of Minnesota in 1952.

(CLASSIFIED ADS—*continued from p. 42*)

Lucrative Massachusetts practice for sale; no competition. Price of $20,000 includes combined home—clinic, plus all equipment and drugs. Full particulars supplied on request. Address "Box K 11," c/o JOURNAL of the AVMA.

Miscellaneous

Breedersleve—The disposable obstetrical sleeve. Package of 20 with detachable chest band, $5.00; lower wholesale prices. Free sample upon request. Breeders Equipment Co., Flourtown, Pa.

Pregnancy diagnosis in mares—45th to 150th day. Request mailing tubes; $7.00, 2 or more, $6.00 each. Pregnancy Diagnostic Laboratories, Dysart, Iowa.

Priced for Quick Sale—10-watt Motorola base station complete with antennae and lead. Excellent condition; $295. Address Merrill Ranck, D.V.M., Prospect, Ohio.

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CLIPPER BLADE & SHEAR

GRINDER

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(for medium and heavy duty!)

Deluxe Model "C" features
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Remember — the Sun Ray GRINDER is specifically designed for the veterinarian so that no special experience is needed to grind clipper blades and thinning shears to professional sharpness.

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THAT'S ALL . . . . and you can never oversharpen any blade.

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(Freight Prepaid) — No C.O.D.'s.
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For further information write us. — TODAY.

EACH MACHINE FULLY GUARANTEED FOR 1 YEAR

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This training can be started when he is 6 to 8 weeks old by teaching him to retrieve a ball, using the word "fetch," then teaching him directions by having him fetch the ball to other persons. Ducks or geese may be substituted for the ball and then hogs, sheep, or cattle, but never horses.

The circling instinct in the Collie makes him valuable in preventing sheep from wandering where predatory animals or other mishaps my befall them.—*The Sheep Breeder, Feb., 1956.*

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...it's a real 'TAIL WAGGER'...

WAYNE DOG FOOD

ALLIED MILLS, INC., Dog Food Division, Ft. Wayne, Ind.

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Hog Cholera and
Erysipelas quickly...
safely...with
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Full modified virus, vacuum dried, porcine origin, when used with serum confers quick, positive immunity.
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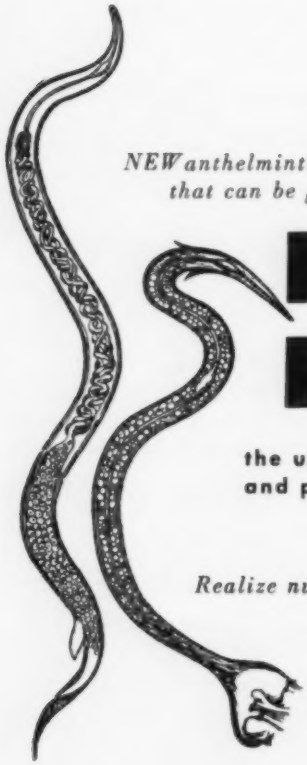

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Canine Distemper Vaccine in Bronchisepticus-Streptococcus-Typhimurium Bacterin.

Introducing two new members of the
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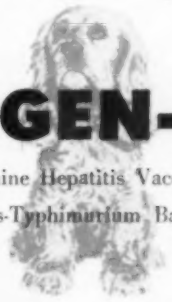
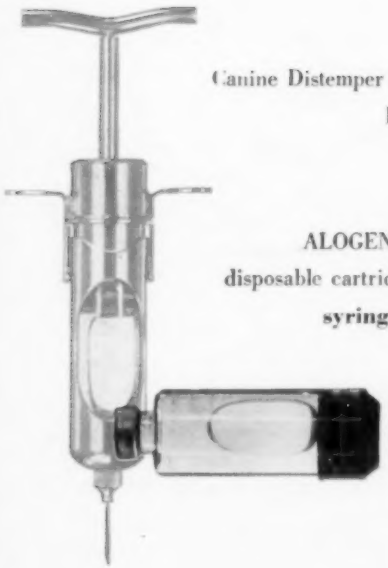


ALOGEN-H

Canine Distemper Vaccine and Infectious Canine Hepatitis Vaccine in Bronchisepticus-Streptococcus-Typhimurium Bacterin.



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